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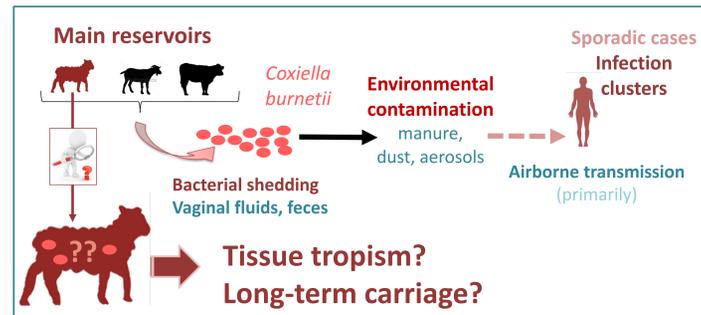
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Post-mortem detection of *Coxiella burnetii* in 8 ewes from a flock recently confronted with Q fever clustered human cases sampled 89 to 229 days post-lambing



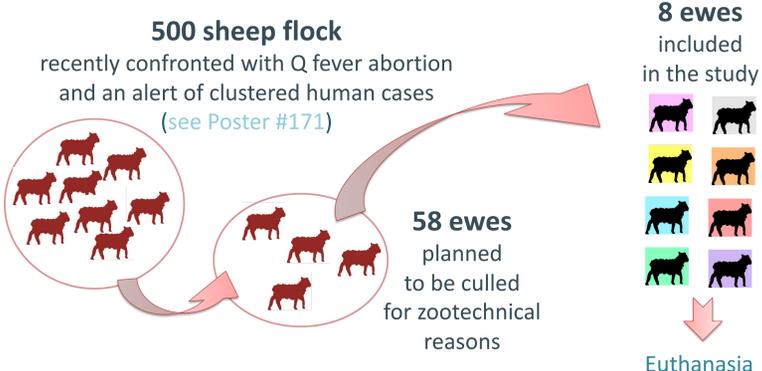
Elsa Jourdain¹, François Schelcher², Marie-Noelle Lucas², Mathilde Poivre³, Jérôme Lafon⁴, Séverine Barry¹, Aurélie Couesnon⁵, Richard Thiéry⁵, Elodie Rousset⁵

Q fever is a zoonotic disease caused by *Coxiella burnetii*. Domestic ruminants, including sheep, provide a major primary reservoir of exposure for humans. Bacterial shedding is massive in clinically affected flocks through the vaginal fluids and feces of infected ewes, secondarily contaminating bedding areas and other indoor and outdoor environments^{1,2}. However, knowledge on tissue tropism and long-term carriage by individual ewes remains scarce.



OBJECTIVE: to investigate *C. burnetii*'s tissue dissemination in ewes more than 3 months post-lambing

METHODS



- **Histopathology**
- **Serology:** PRIOCHECK commercial test
- **qPCR:** in-house method targeting IS1111 → limit of quantification (LOQ) estimated at 200 bacteria per swab or milliliter of suspension

Collection of diverse tissues, swabs and body fluids (see Table)

Protocol approved by Vet AgroSup's ethic committee (no 1929)

Description of the 8 selected ewes

<ol style="list-style-type: none"> Parity Reason for culling Lambing circumstances Post-partum vaginal shedding qPCR test "Day x" post-partum <ul style="list-style-type: none"> Vaginal: vaginal shedding Nasal: anterior nasal shedding 	<ol style="list-style-type: none"> Multiparous Mastitis Normal lambing Not tested Day 64 pp[§] <ul style="list-style-type: none"> Vaginal: 6.5E+2 Nasal: negative 	<ol style="list-style-type: none"> Multiparous Udder shape Normal lambing 2.3E+9 (Day 4 pp[§]) Day 122 pp[§] <ul style="list-style-type: none"> Vaginal: 7.5E+2 Nasal: Not tested
<ol style="list-style-type: none"> Primiparous Milk somatic cells Normal lambing Not tested Day 158 pp[§] <ul style="list-style-type: none"> Vaginal: 2.8E+2 Nasal: negative 	<ol style="list-style-type: none"> Multiparous Old ewe Normal lambing Not tested Day 64 pp <ul style="list-style-type: none"> Vaginal: negative Nasal: 3.7E+2 	<ol style="list-style-type: none"> Multiparous Old ewe Normal lambing Not tested Day 177 pp[§] <ul style="list-style-type: none"> Vaginal: negative Nasal: negative
<ol style="list-style-type: none"> Multiparous Low milk production 1 stillborn lamb Not tested Day 182 pp[§] <ul style="list-style-type: none"> Vaginal: 1.3E+3 Nasal: negative 	<ol style="list-style-type: none"> Multiparous Udder shape 1 stillborn lamb Not tested Day 203 pp[§] <ul style="list-style-type: none"> Vaginal: negative Nasal: <LOQ 	<ol style="list-style-type: none"> Multiparous Udder shape 1 stillborn lamb Not tested Day 202 pp[§] <ul style="list-style-type: none"> Vaginal: negative Nasal: 3.9E+2

[§] pp: post-partum

RESULTS

Time-frame between lambing and necropsy ranged from 89 to 229 days

	Histopathology	Serology	qPCR analyses							
	No macroscopic nor microscopic lesion relevant to diagnostic purposes	All serologies positive or near positivity threshold	Low levels of <i>C. burnetii</i> DNA detected in 1 to 6 samples depending on the considered ewe (see Table)							
Ewe number	days post-lambing at necropsy	1	2	3	4	5	6	7	8	
		89	152	181	205	205	208	227	229	
Shedding (swabs)	Vaginal	-	+	-	-	+	-	+	-	
	Anterior nasal	-	-	6.5E+3*	+	-	+	+	-	
	Deep nasal	-	-	-	-	-	+	+	-	
Body fluids	Milk	-	-	+	-	-	-	-	-	
	Serum	-	-	-	+	-	-	-	-	
Organs (swabs or crushed tissues)	Bone marrow	-	-	-	-	-	-	+	-	
	Uterus	-	-	-	-	-	-	+	-	
	Ovary	-	-	-	-	-	-	+	-	
	Bladder	-	-	+	-	-	-	-	-	
	Mammary LN	-	+	-	-	-	-	-	+	
	Peyer's patches	-	-	+	-	-	-	-	-	
	Cardiac valves	+	+	-	-	-	-	-	-	

Table : qPCR results obtained from the samples collected at necropsy (LN: lymph node)

No detection in: tonsils, bronchi, lungs, spleen, kidney, ileus lymph node, colon, feces and wool

+: DNA detection with bacterial load <LOQ (tardive Ct-value but curve shape typical of specific amplification)

- : no DNA detection * : bacterial load in GE per swab

DISCUSSION & CONCLUSION

All ewes included in the study presented evidence of past or current infection by *C. burnetii* without displaying any macroscopic or microscopic lesion potentially-associated to infection

C. burnetii DNA was detected in diverse tissues and body fluids including not only the genital tract but also the respiratory tract as well as cardiac valves, bone marrow and Peyer's patches

⚠ with one exception, bacterial loads were too low to be precisely quantified (<LOQ=200 bacteria per swab or milliliter)



These results in sheep

Previous data from experimental infection in goats^{3,4}



...raise questions about

- the reality of long-term bacterial carriage by small ruminants coming from flocks with *C. burnetii* circulation
- the occurrence of potential sub-clinical effects due to the infection of organs other than those of the genital tract

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References

- Joulié *et al.* Circulation of *Coxiella burnetii* in a naturally infected flock of dairy sheep: shedding dynamics, environmental contamination, and genotype diversity. *Appl Environ Microbiol* 2015,81(20): 7253-7260.
- Carrié *et al.* Swab cloths as a tool for revealing environmental contamination by Q fever in ruminant farms. *Transbound Emerg Dis* 2019, 66(3):1202-1209
- Roest *et al.* Q fever in pregnant goats: pathogenesis and excretion of *Coxiella burnetii*. *PloS ONE* 2012,7(11): e48949
- Sánchez *et al.* Experimental *Coxiella burnetii* infection in pregnant goats: a histopathological and immunohistochemical study. *J Comp Pathol* 2006,135(2-3):108-115