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

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International intracellular bacteria meeting 2022

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Poster #161

SCAN ME

Elsa Jourdain[1], François Schelcher[2], Marie-Noelle Lucas[2], Mathilde Poivre[3], Jérôme Lafon[4], Séverine Barry[1], Aurélie Couesnon[5], Richard Thiéry[5], Elodie Rousset[5]

[1] Université Clermont Auvergne, INRAE, VetAgro Sup, UMR EPIA, Saint-Genès-Champanelle, France

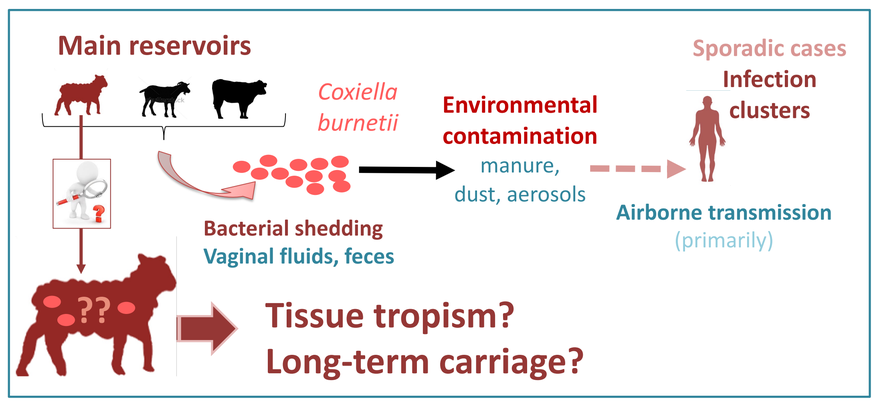
[2] IHAP, Université de Toulouse, INRAE, ENVT, Toulouse, France

[3] Exploitation agricole d'Oloron, Lycée des Métiers de la Montagne, Oloron Sainte Marie, France

[4] Clinique Vétérinaire du Haut-Béarn, Oloron Sainte Marie, France

[5] ANSES, Laboratoire de Sophia Antipolis, Unité Fièvre Q, Sophia Antipolis, France

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

500 sheep flock
recently confronted with Q fever abortion and an alert of clustered human cases (see Poster #171)

58 ewes
planned to be culled for zootechnical reasons

8 ewes
included in the study

Euthanasia

- **Histopathology**
- **Serology**: PRIOCHECK commercial test
- **qPCR**: in-house method targeting IS*1111*
  → 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

1. **Parity**
2. **Reason for culling**
3. **Lambing circumstances**
4. **Post-partum vaginal shedding**
5. **qPCR test "Day x" post-partum**
   - *Vaginal*: vaginal shedding
   - *Nasal*: anterior nasal shedding

Ewe 1
1. **Multiparous**
2. Mastitis
3. Normal lambing
4. *Not tested*
5. Day 64 pp§
   - *Vaginal*: **6.5E+2**
   - *Nasal*: negative

Ewe 2
1. **Multiparous**
2. Udder shape
3. Normal lambing
4. **2.3E+9** (Day 4 pp§)
5. Day 122 pp§
   - *Vaginal*: **7.5E+2**
   - *Nasal*: *Not tested*

Ewe 3
1. Primiparous
2. Milk somatic cells
3. Normal lambing
4. *Not tested*
5. Day 158 pp§
   - *Vaginal*: **2.8E+2**
   - *Nasal*: negative

Ewe 4
1. **Multiparous**
2. Old ewe
3. Normal lambing
4. *Not tested*
5. Day 64 pp
   - *Vaginal*: negative
   - *Nasal*: **3.7E+2**

Ewe 5
1. **Multiparous**
2. Old ewe
3. Normal lambing
4. *Not tested*
5. Day 177 pp§
   - *Vaginal*: negative
   - *Nasal*: negative

Ewe 6
1. **Multiparous**
2. Low milk production
3. **1 stillborn lamb**
4. *Not tested*
5. Day 182 pp§
   - *Vaginal*: **1.3E+3**
   - *Nasal*: negative

Ewe 7
1. **Multiparous**
2. Udder shape
3. **1 stillborn lamb**
4. *Not tested*
5. Day 203 pp§
   - *Vaginal*: negative
   - *Nasal*: **<LOQ**

Ewe 8
1. **Multiparous**
2. Udder shape
3. **1 stillborn lamb**
4. *Not tested*
5. Day 202 pp§
   - *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 *C. burnetii* DNA detected in 1 to 6 samples depending on the considered ewe (see Table)

	Ewe number / days post-lambing at necropsy	1 (89)	2 (152)	3 (181)	4 (205)	5 (205)	6 (208)	7 (227)	8 (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 Peyers'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

Contact:
elsa.jourdain@inrae.fr

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