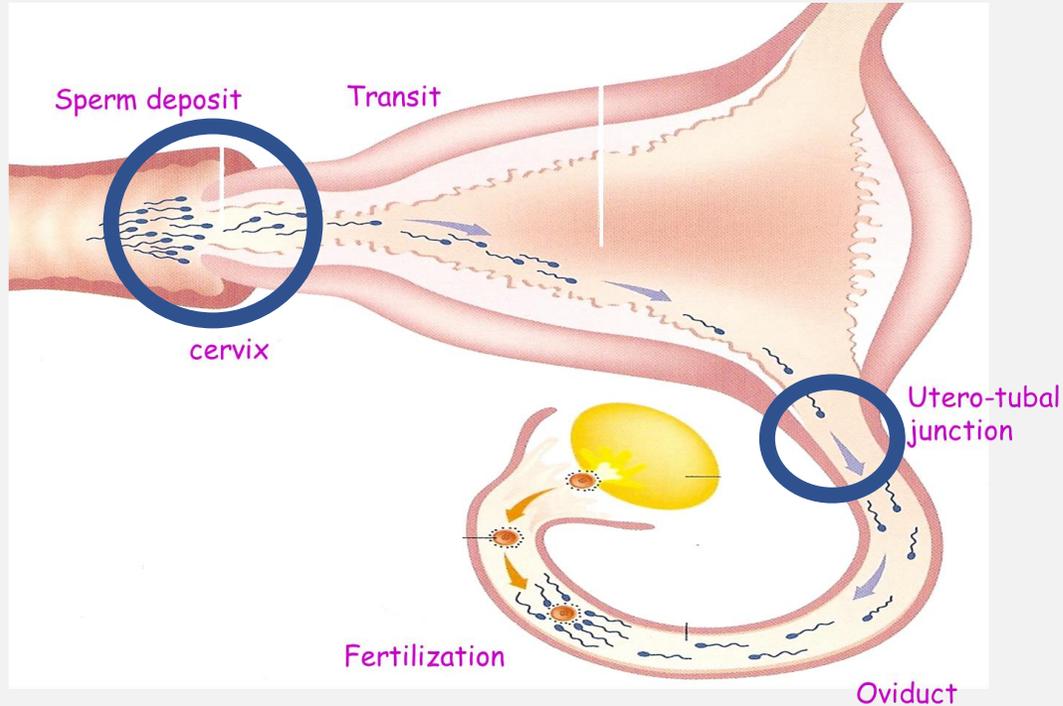




Exploration fonctionnelle du transit des spermatozoïdes dans le tractus génital femelle

Xavier Druart , INRAE PRC PIXANIM

Le transit des spermatozoïdes chez les mammifères



Sélection des spermatozoïdes

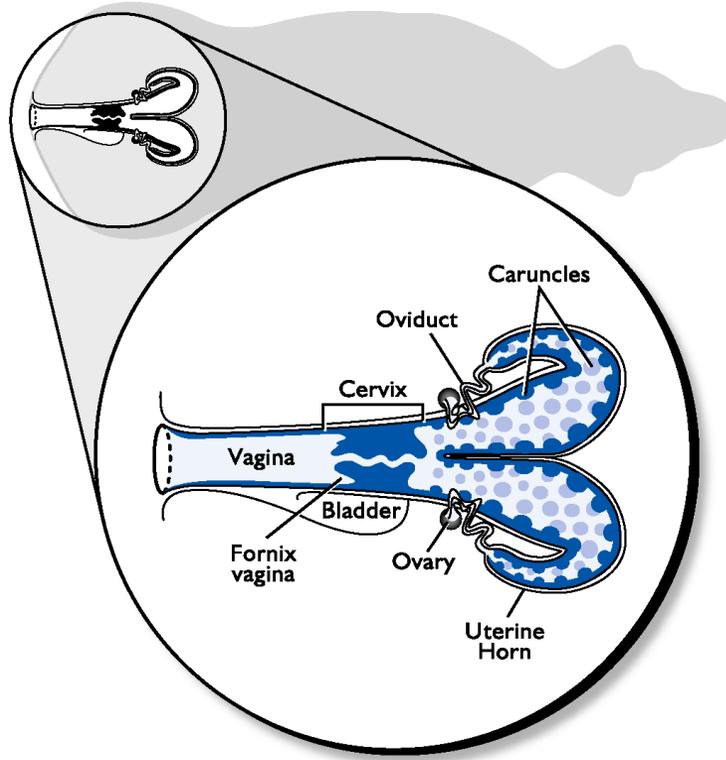
Cervix :

- Mobilité
- Morphologie

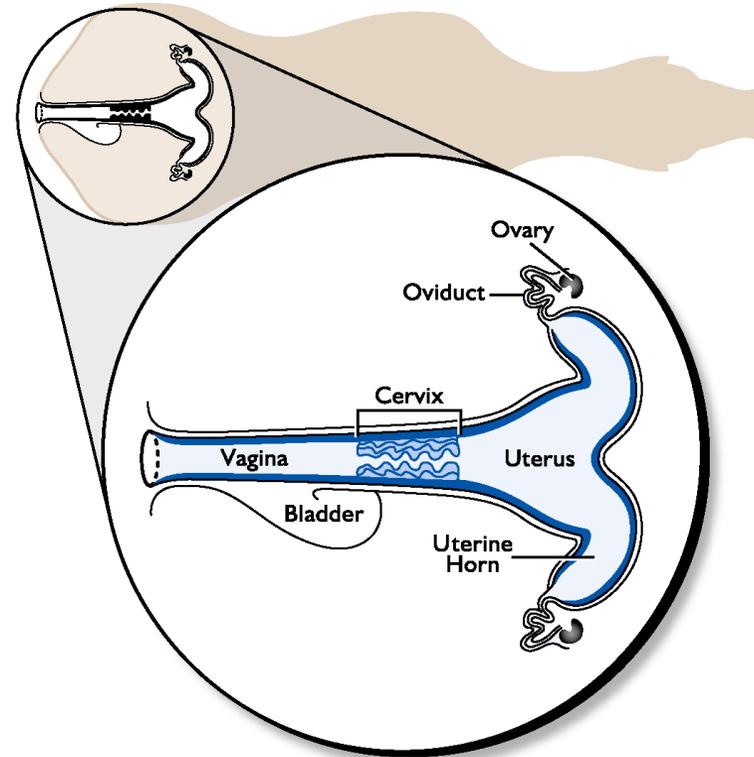
Jonction Utéro-tubaire

- Mobilité
- Protéines de surface (ADAM) (souris)

Réussite de la fécondation dépend du transit adéquat des spermatozoïdes pour la rencontre spermatozoïdes / ovocyte

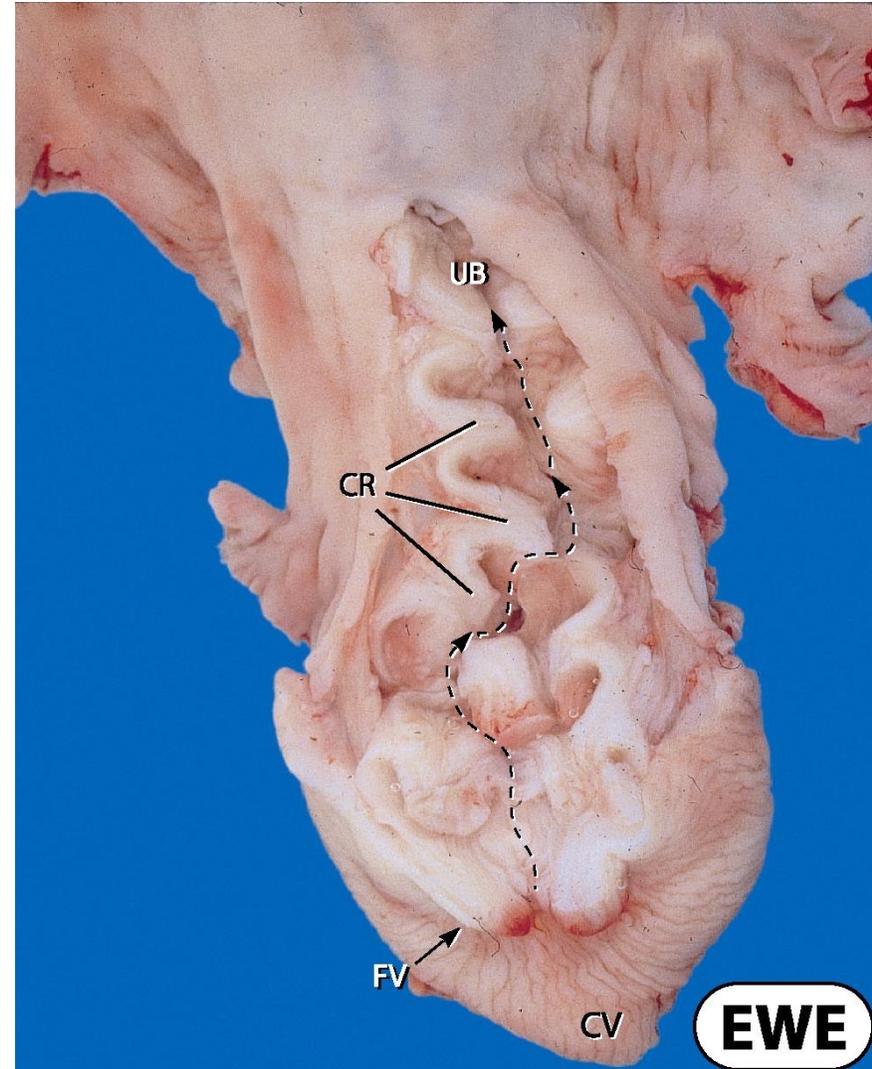
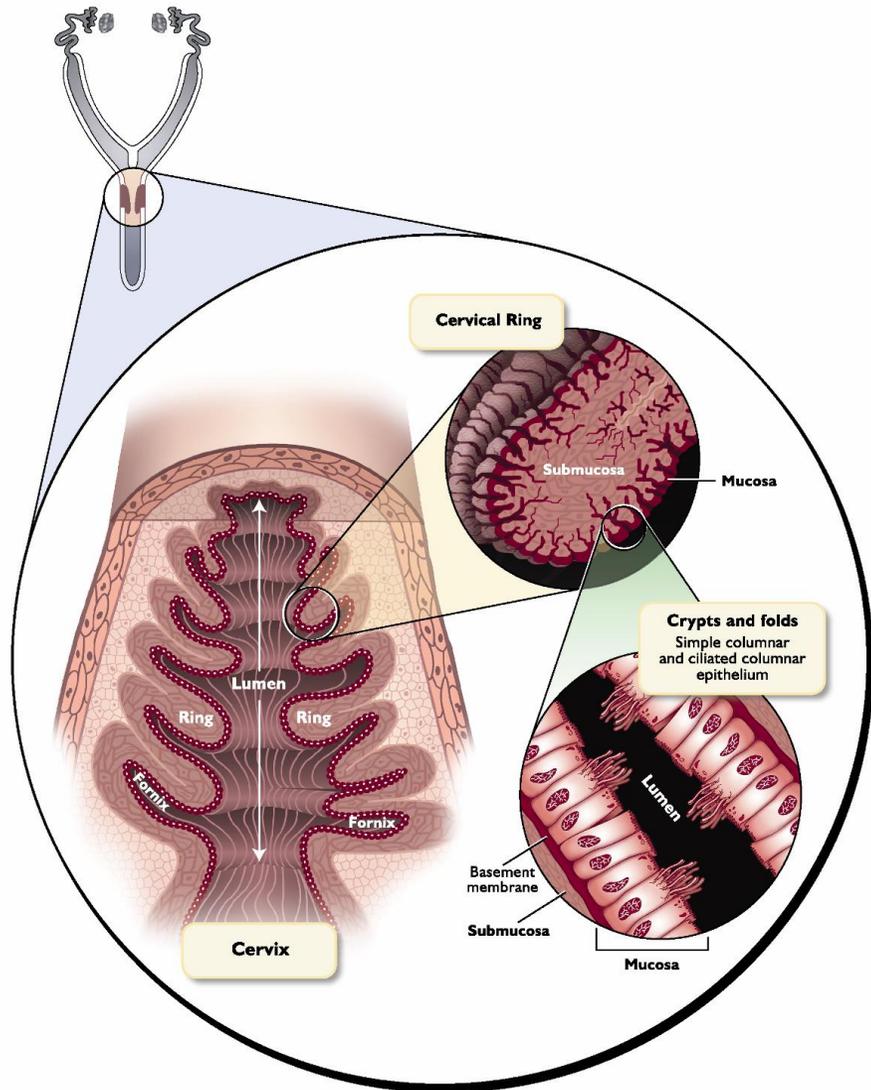


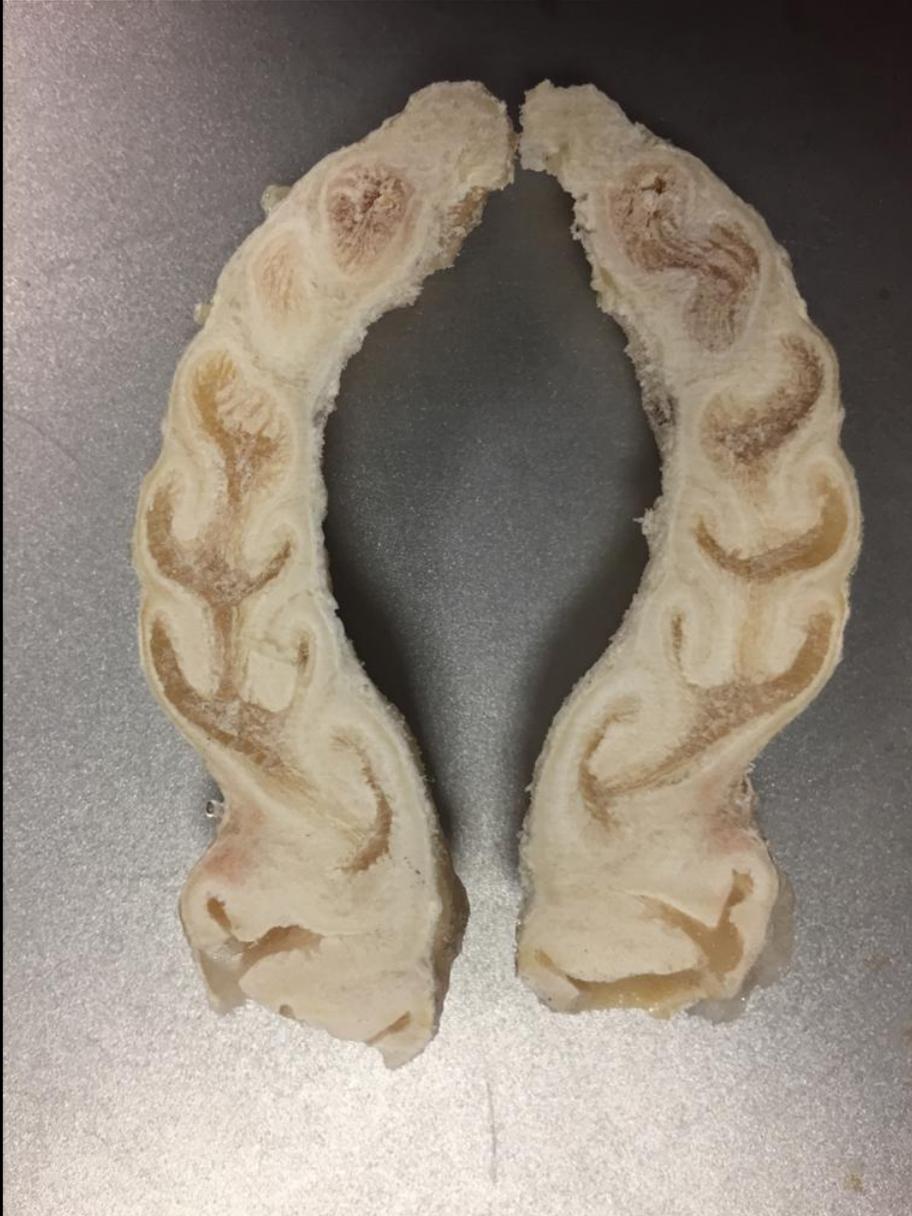
- Dépôt de la semence dans **le vagin**
- Sélection des spermatozoïdes par **le col de l'utérus**
- Rôle potentiel du plasma séminal dans le transit à travers le col



- Dépôt de la semence dans **l'utérus**
- Sélection des spermatozoïdes par **la jonction utéro-tubaire**
- Inflammation de l'endomètre induite par le plasma séminal

Morphologie du col de l'utérus chez la brebis

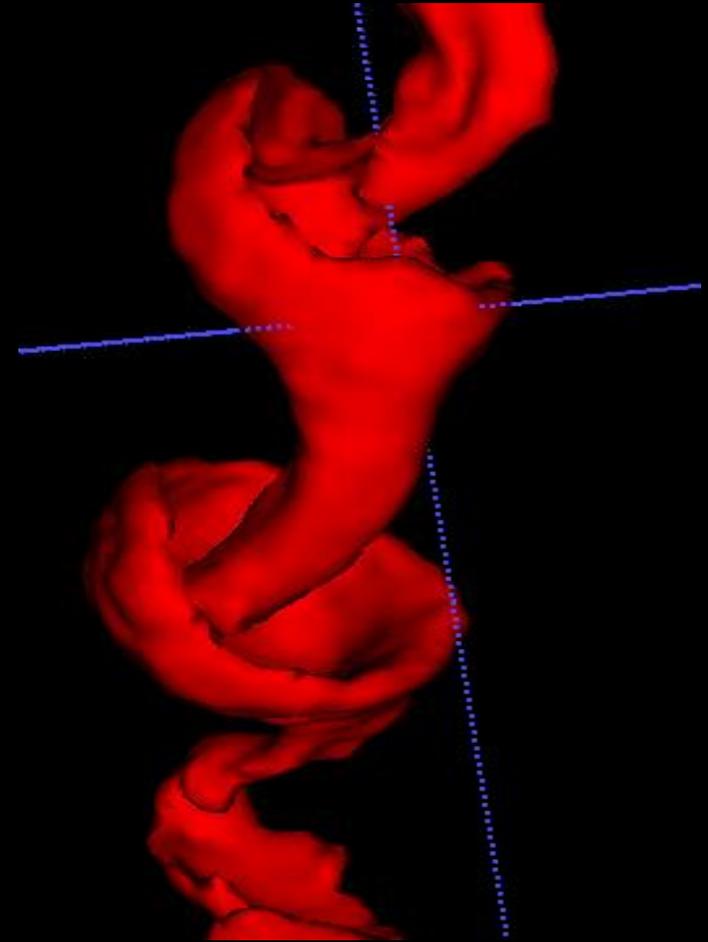
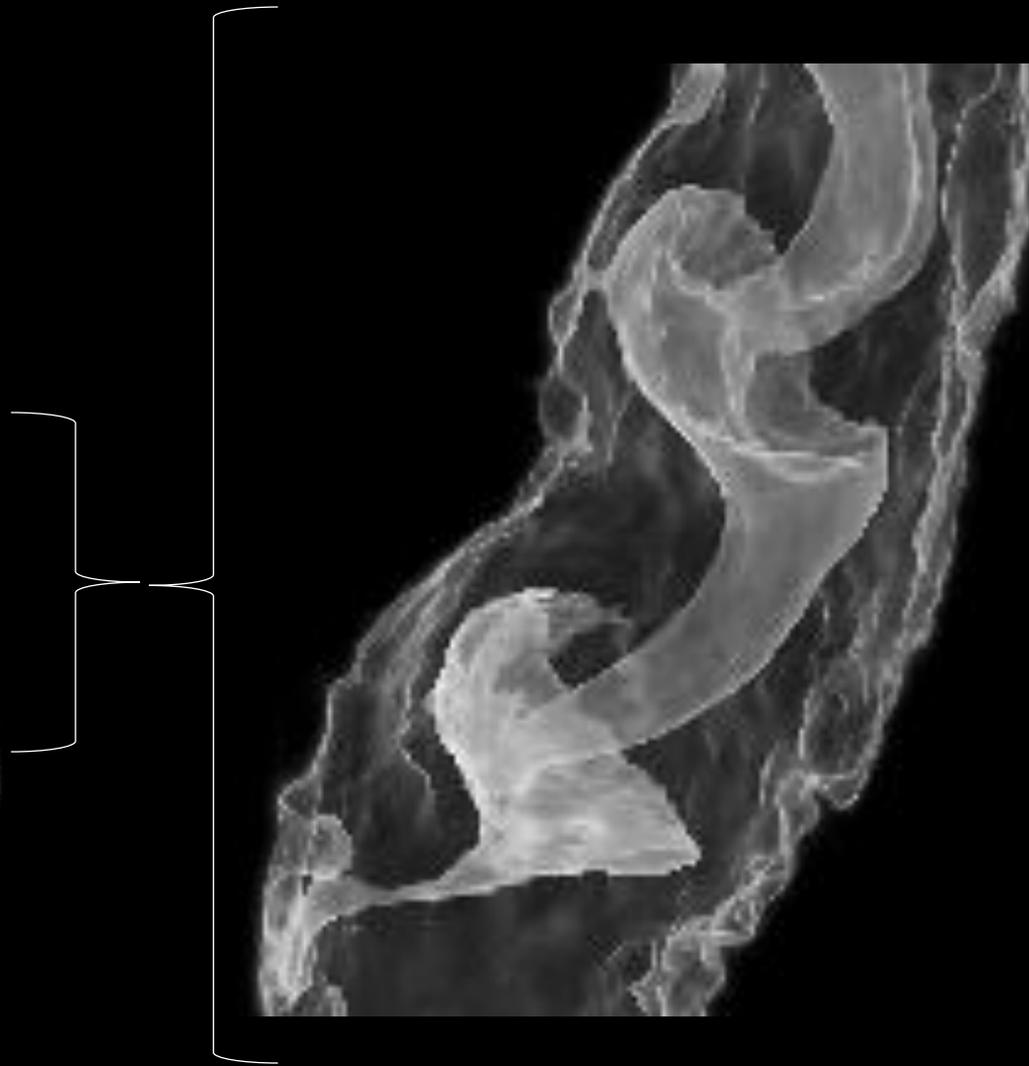


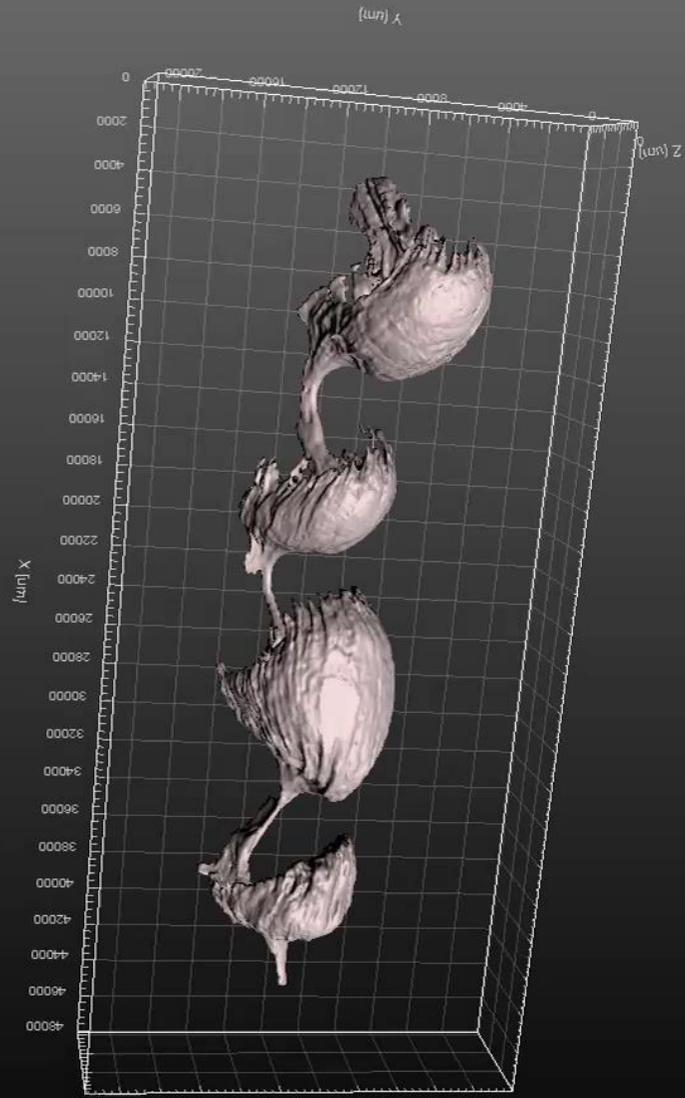


Morphologie du col de l'utérus chez la brebis

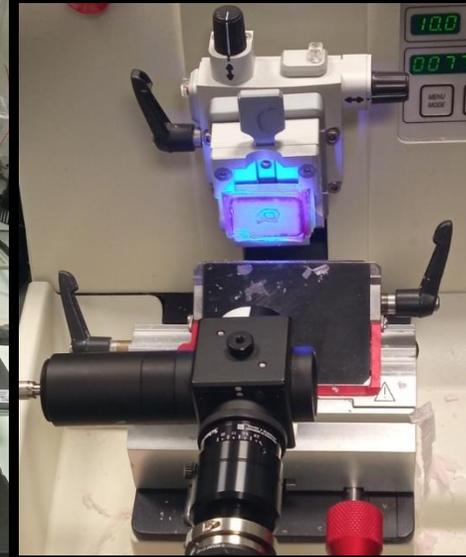
Karine Reynaud

Imagerie IRM du cervix de brebis

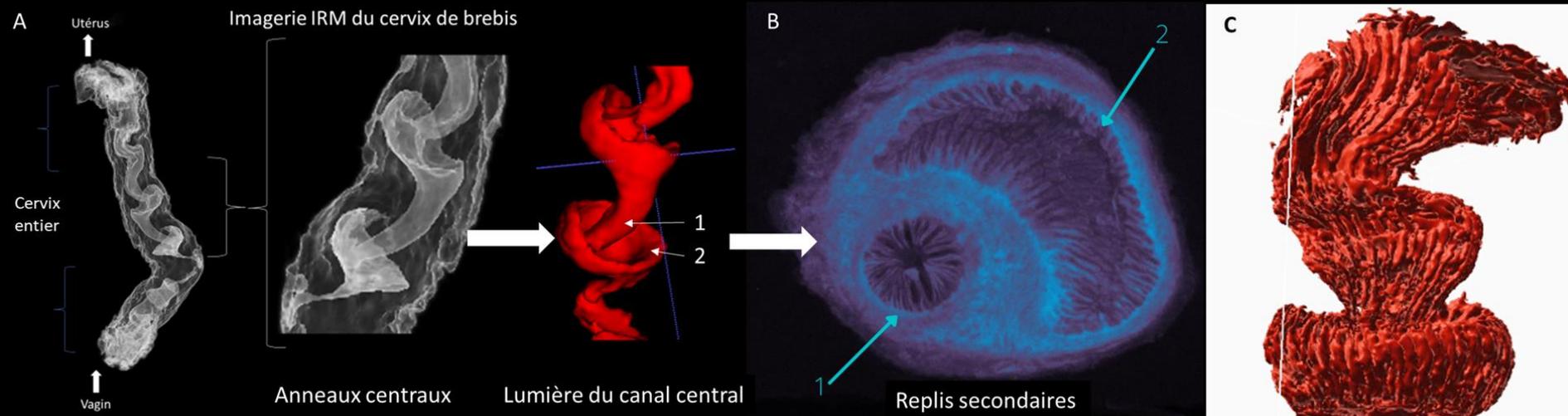




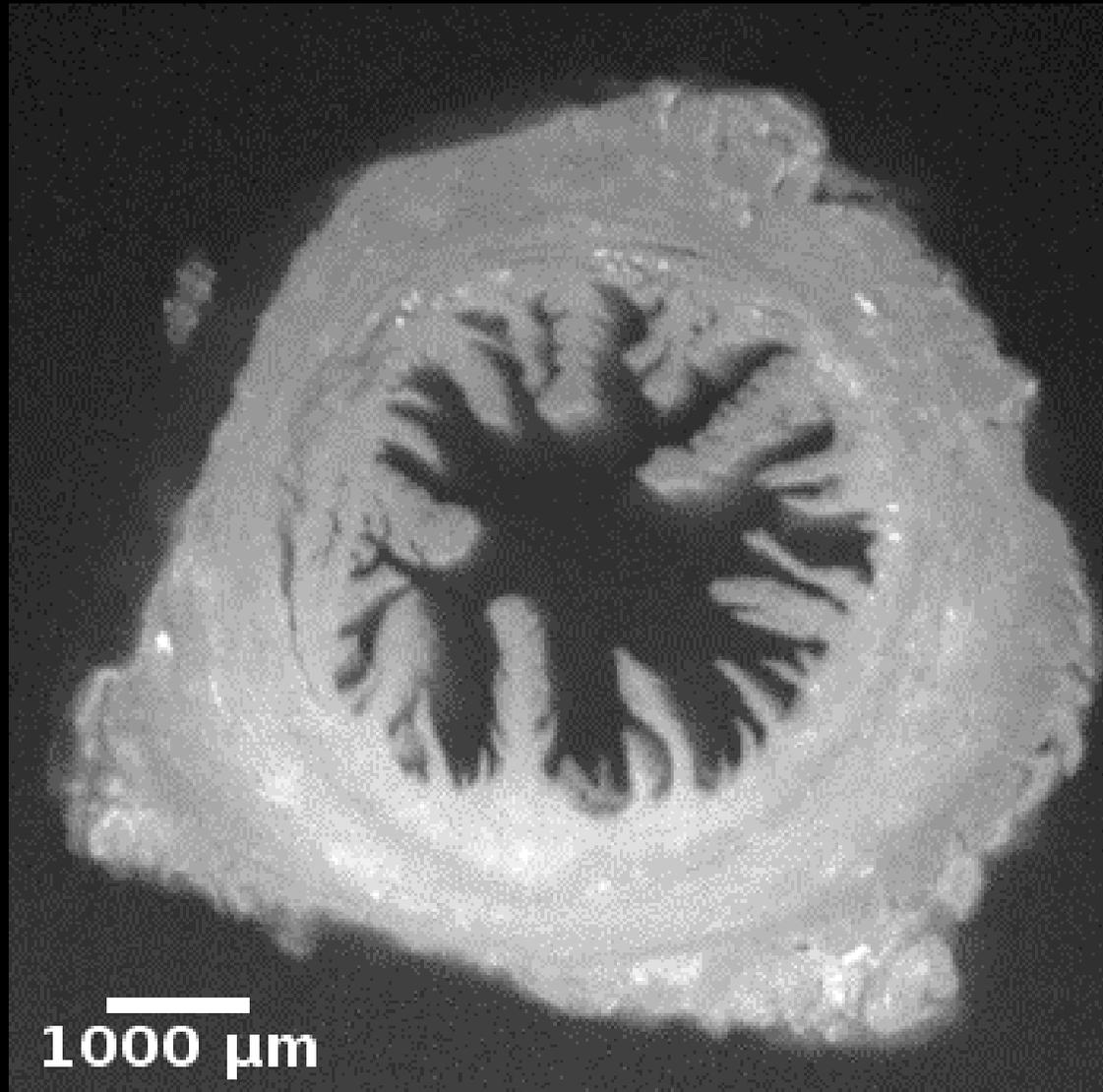
Kratoscope pour reconstruction 3D de type Blockface



Kaer Labs
Nantes



Imagerie de cervix par Kratoscope



Col d'utérus de brebis
coupes de 10 microns

KRATOS-COPE



KRATOS ANATOMY OF A CHARACTER

The life of Kratos is filled with tragedy and triumph, and he has the scars and spoils to prove it. As players take control of the Ghost of Sparta in God of War III, they will notice that he bears the marks of his past, including the legendary artifacts and wounds that he has collected along the way.

GOLDEN FLEECE

Retrieved in the Bog of the Forgotten during the events of God of War II, this legendary piece of armor is nearly impenetrable, granting Kratos the ability to reflect projectiles and parry attacks.

ASH

After slaughtering his own family, the ashes of his deceased loved ones were permanently fused to Kratos' skin – a constant reminder of his terrible mistake. Their pallid hue is the source of Kratos' other moniker, the Ghost of Sparta.

SCAR

This long, jagged scar was created when Zeus impaled Kratos with the Blade of Olympus at the beginning of God of War II. The wound reminds Kratos of the treachery of Zeus – who also happens to be his father.

CHAINS

Thick chains permanently attached to his forearms allow Kratos to swing his blades at distant enemies, making him a threat at any range. The chains also grant him added mobility, since he uses them to swing across gaps.

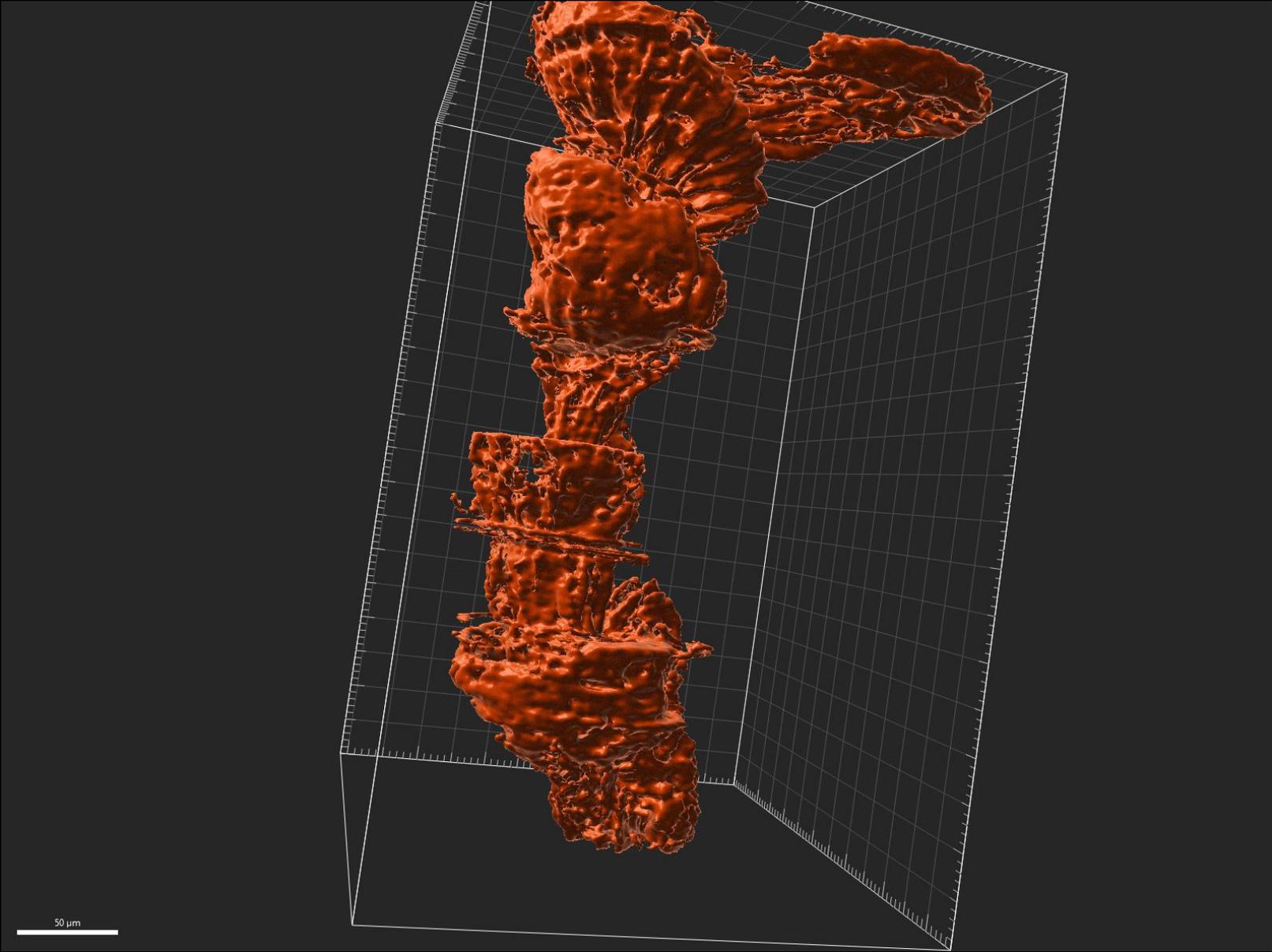
BLADES

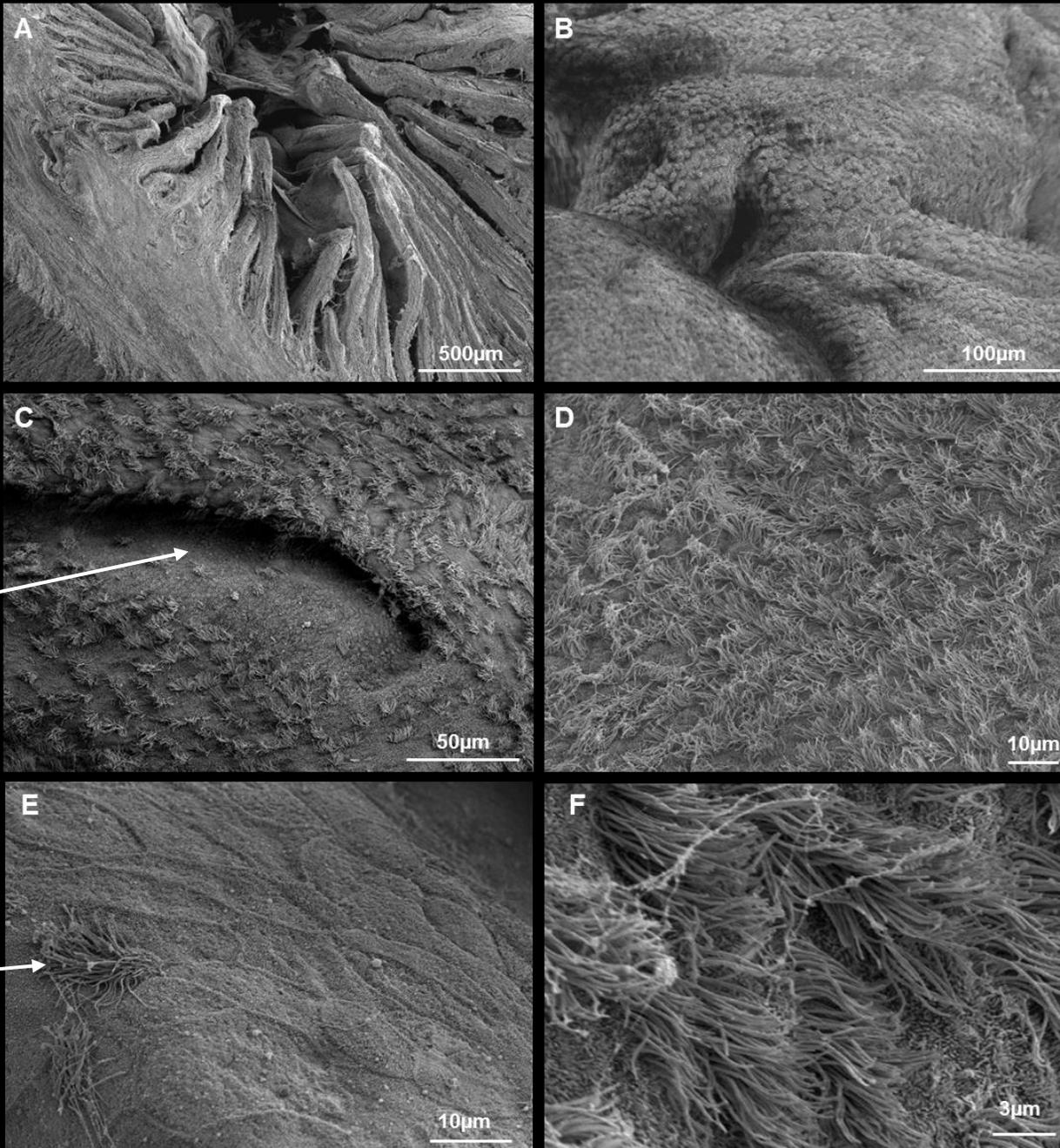
As Kratos' signature weapon, these chain blades cut a fiery swath through his foes. In the original game, they were called the Blades of Chaos. In God of War II, they were upgraded to the Blades of Athena. The trend continues in God of War III, with Kratos receiving yet another improvement to his favored implements of destruction.

SANDALS

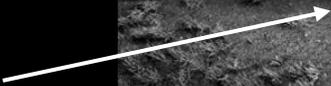
These epic pieces of footwear protect Kratos' mighty arches from the perils of small, sharp rocks and brambles.







crypts



Ciliated epithelial cells



Scanning electron microscopy of the sheep cervix

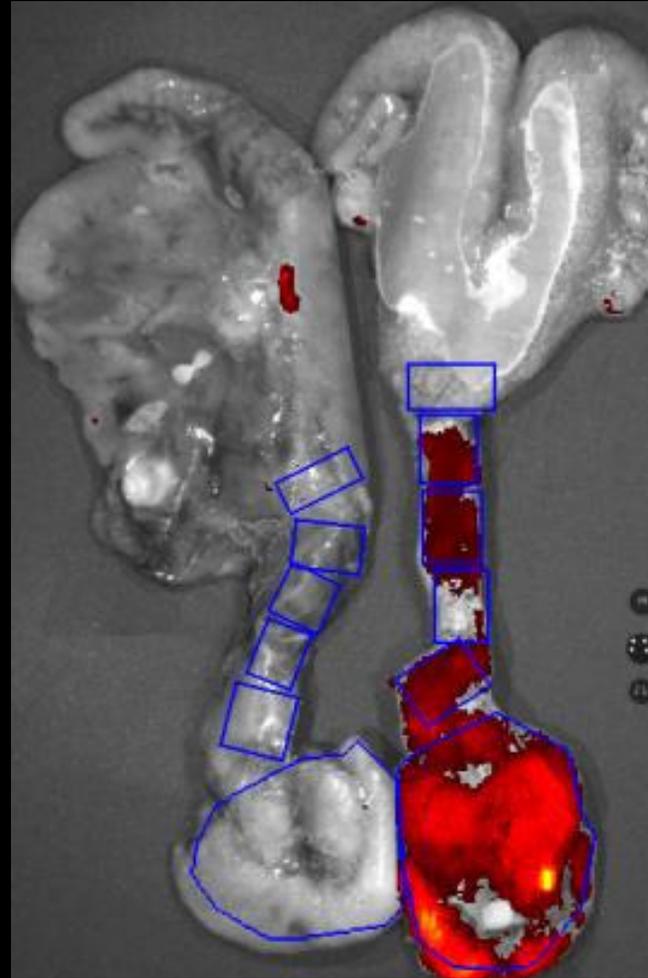
REPRODUCTION
REVIEW

The biological mechanisms regulating sperm selection by the ovine cervix

S Fair¹, K G Meade², K Reynaud³, X Druart³ and S P de Graaf⁴

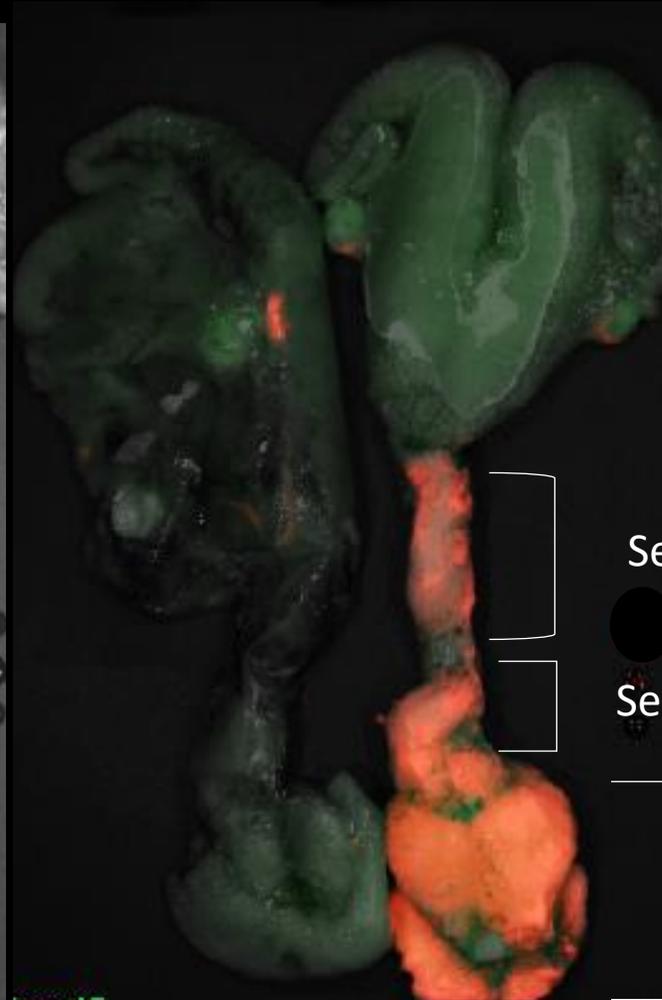
Karine Reynaud, ICF

Sélection des spermatozoïdes par le cervix chez la brebis



Contrôle

4h après IA



Segments médian + utérin

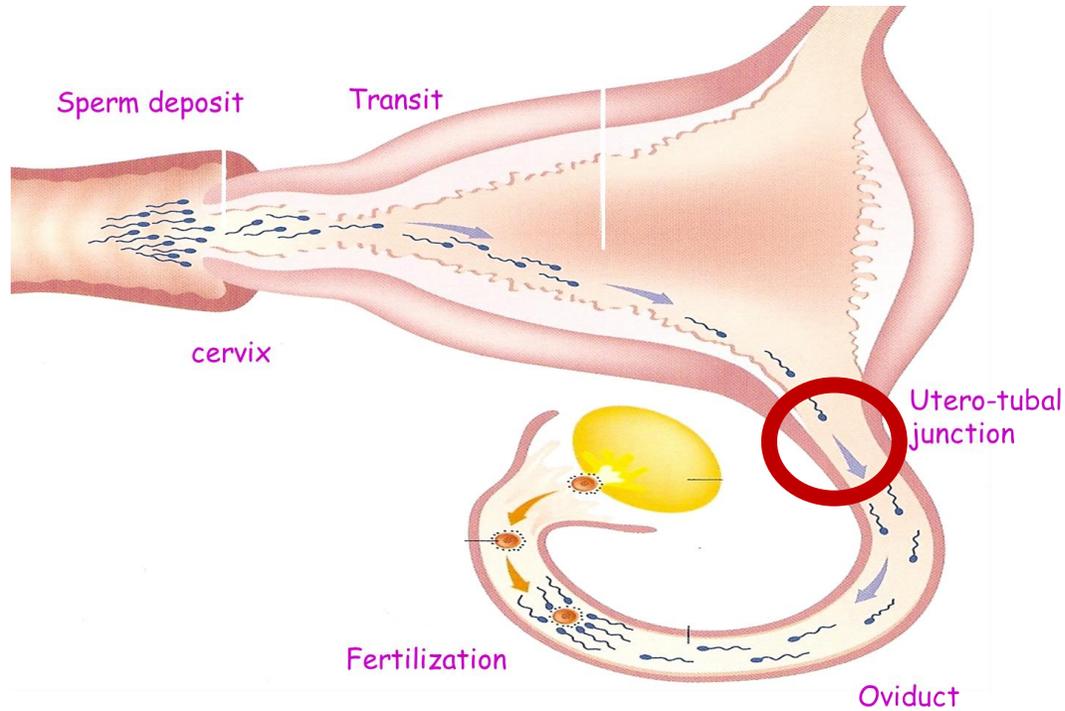
●
Segment vaginal

Vagin

Contrôle

4h après IA

Le transit des spermatozoïdes chez les mammifères



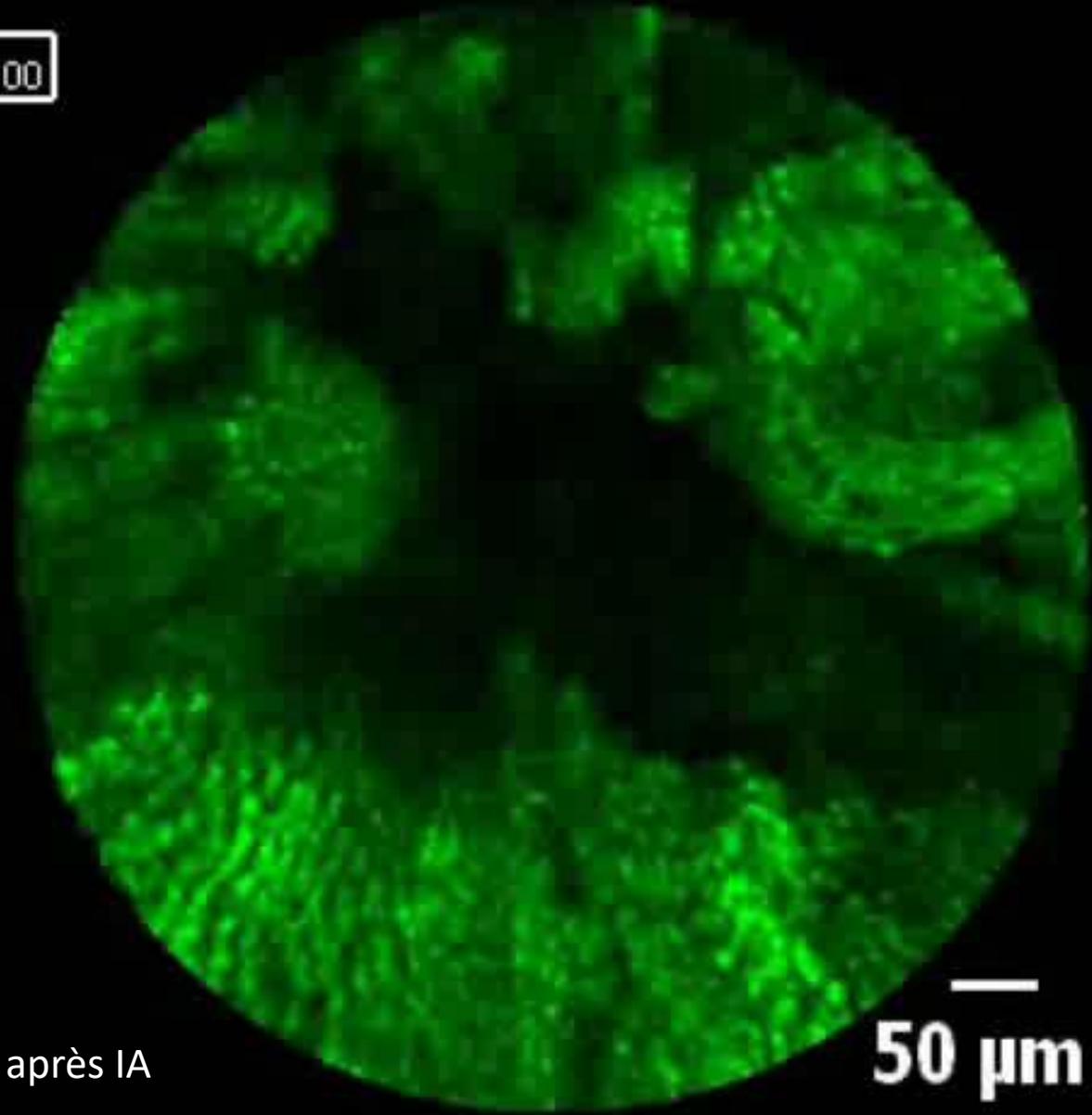
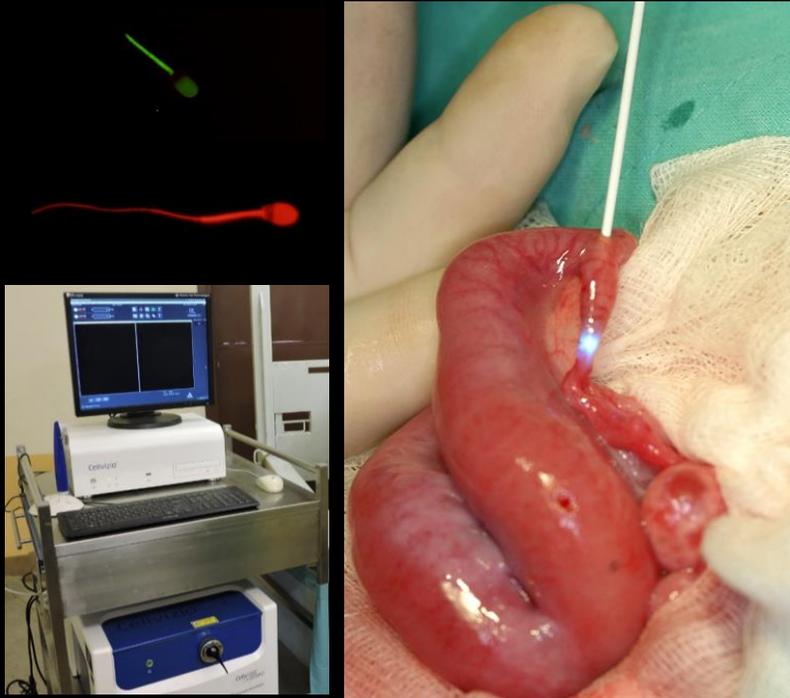
Sélection des spermatozoïdes

Jonction Utéro-tubaire

- Mobilité
- Protéines de surface (ADAM) (souris)

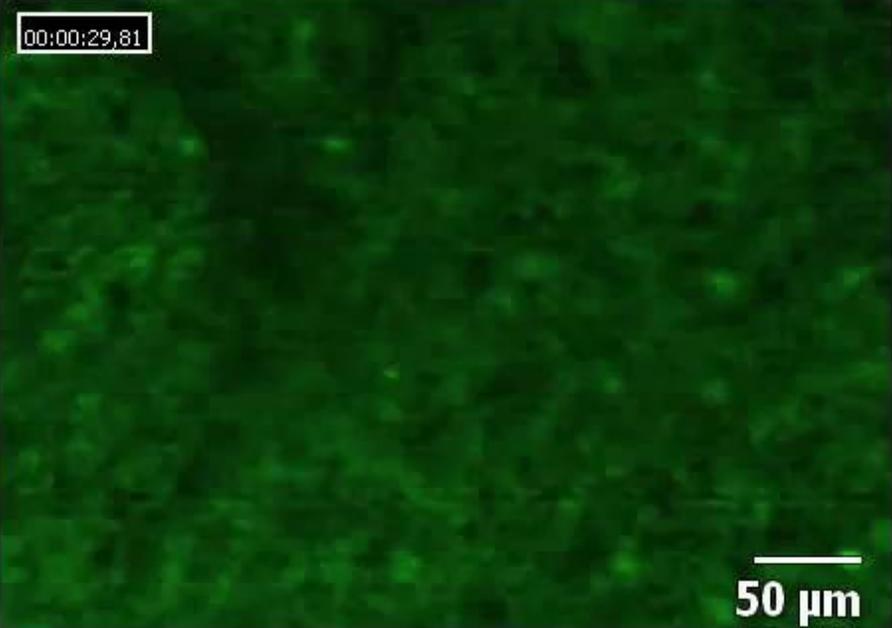
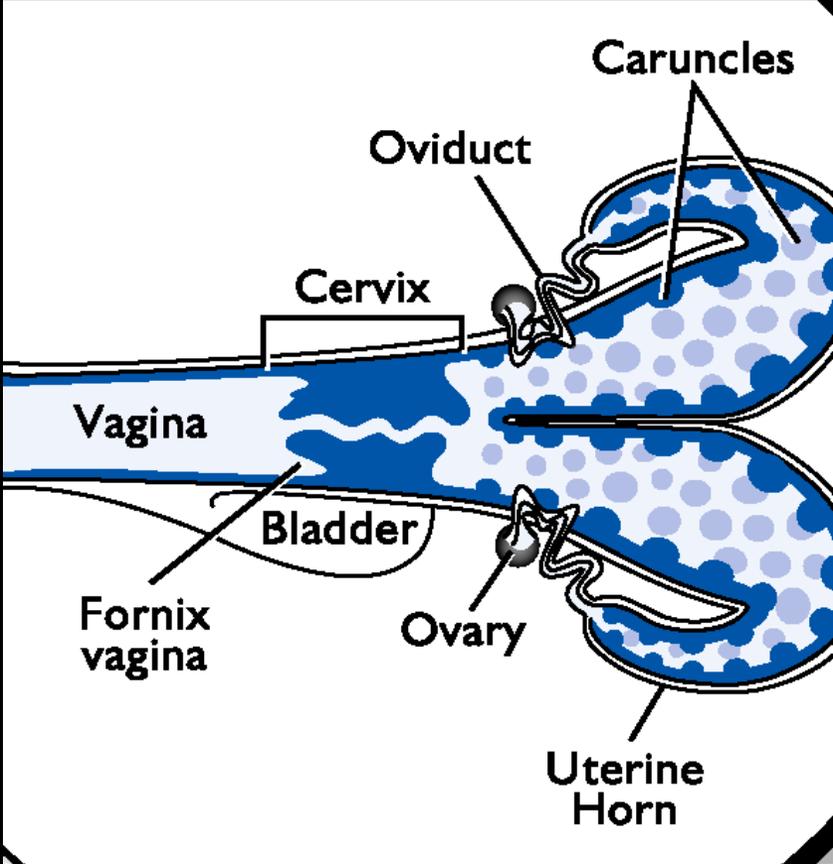
Visualisation des spermatozoïdes
dans la jonction utéro-tubaire
chez la brebis *in vivo*

00:00:00,00

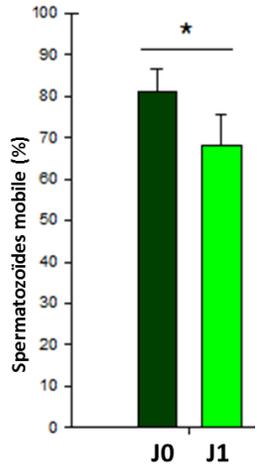
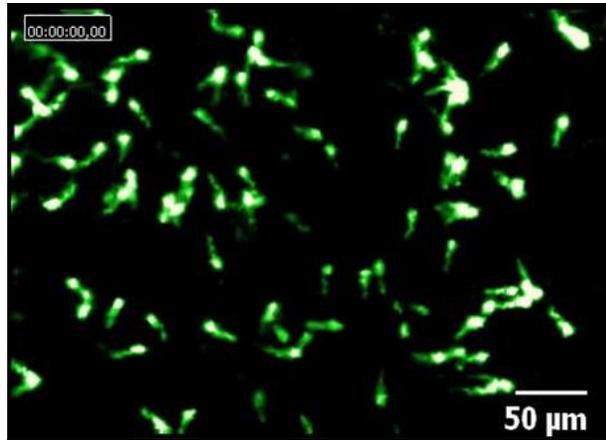
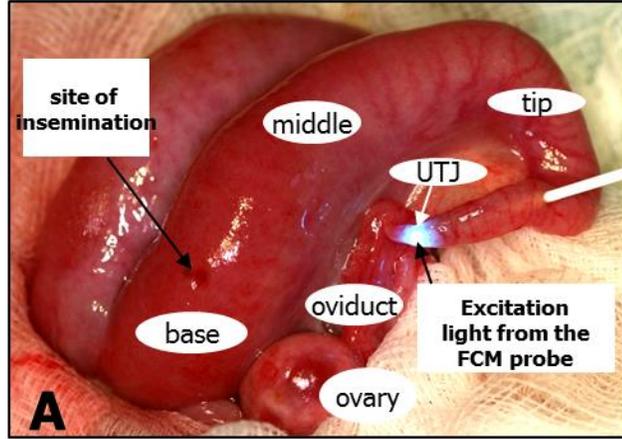
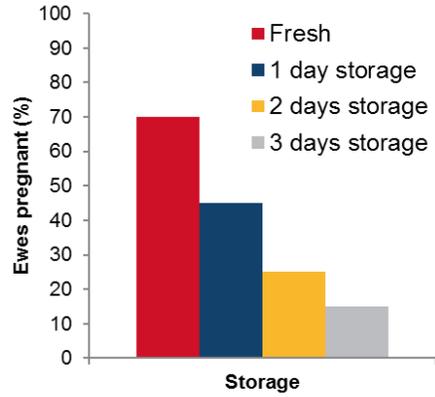


- Marquage fluorescent des spermatozoïdes
- Insémination intra utérine
- Anesthésie générale et imagerie par endoscopie 4h après IA

Visualisation des spermatozoïdes dans l'utérus chez la brebis *in vivo*

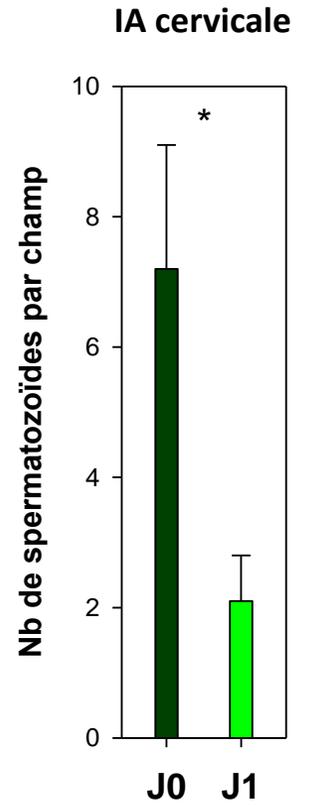
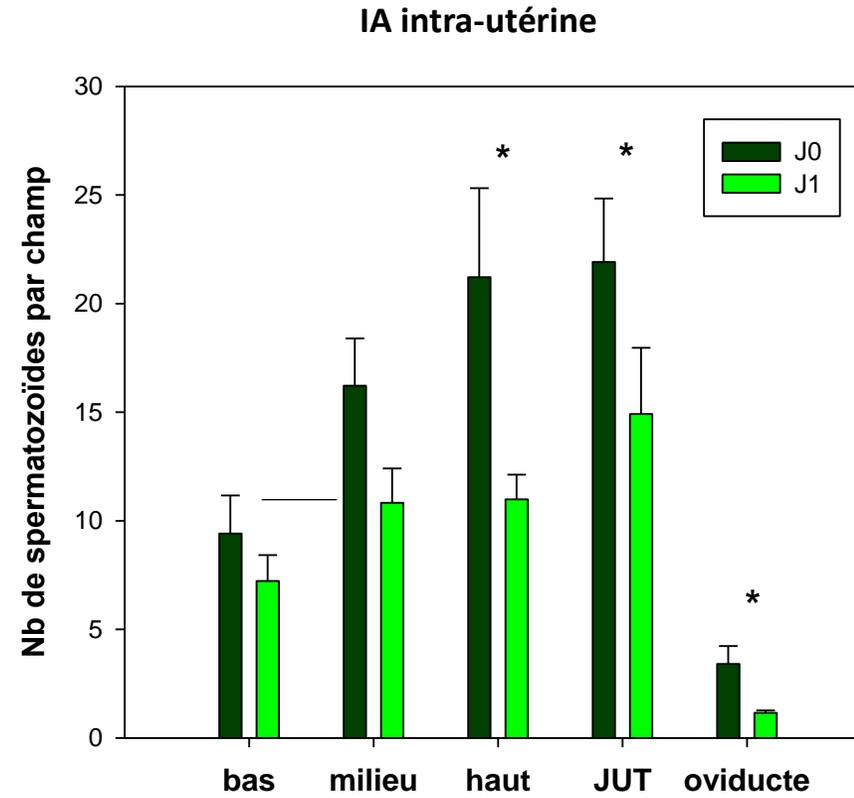


Conservation de la semence de bélier et transit dans l'utérus

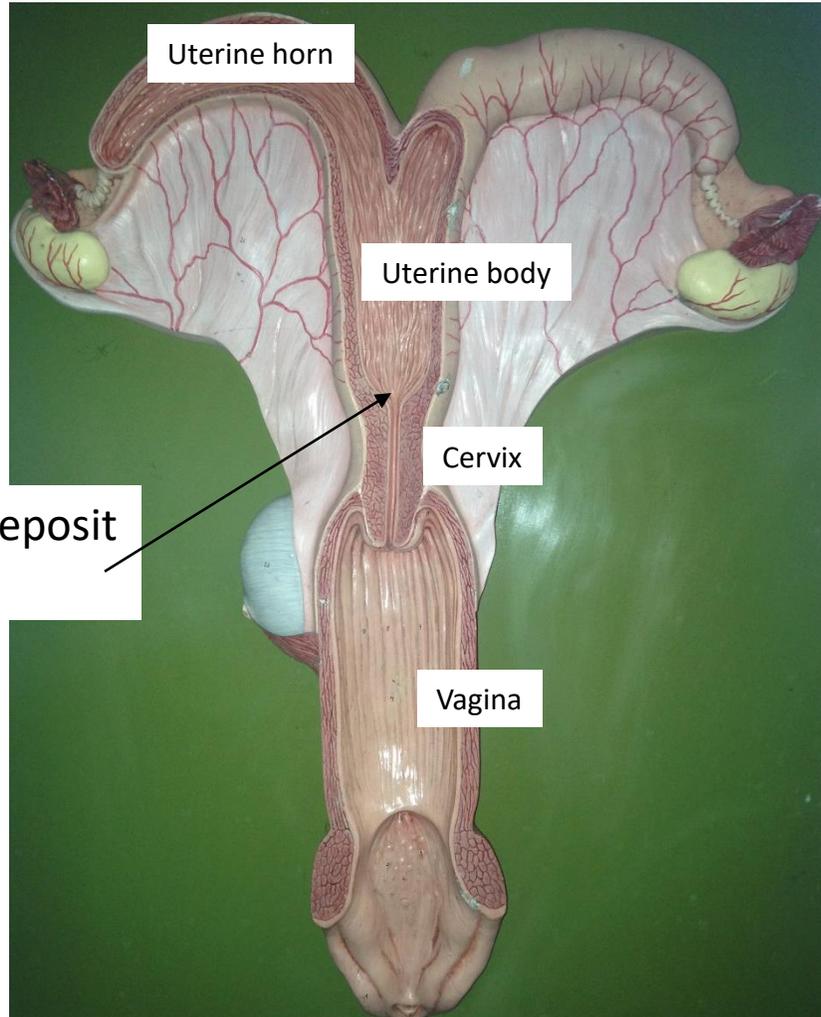


In vitro

In vivo



Le transit des spermatozoïdes chez la jument



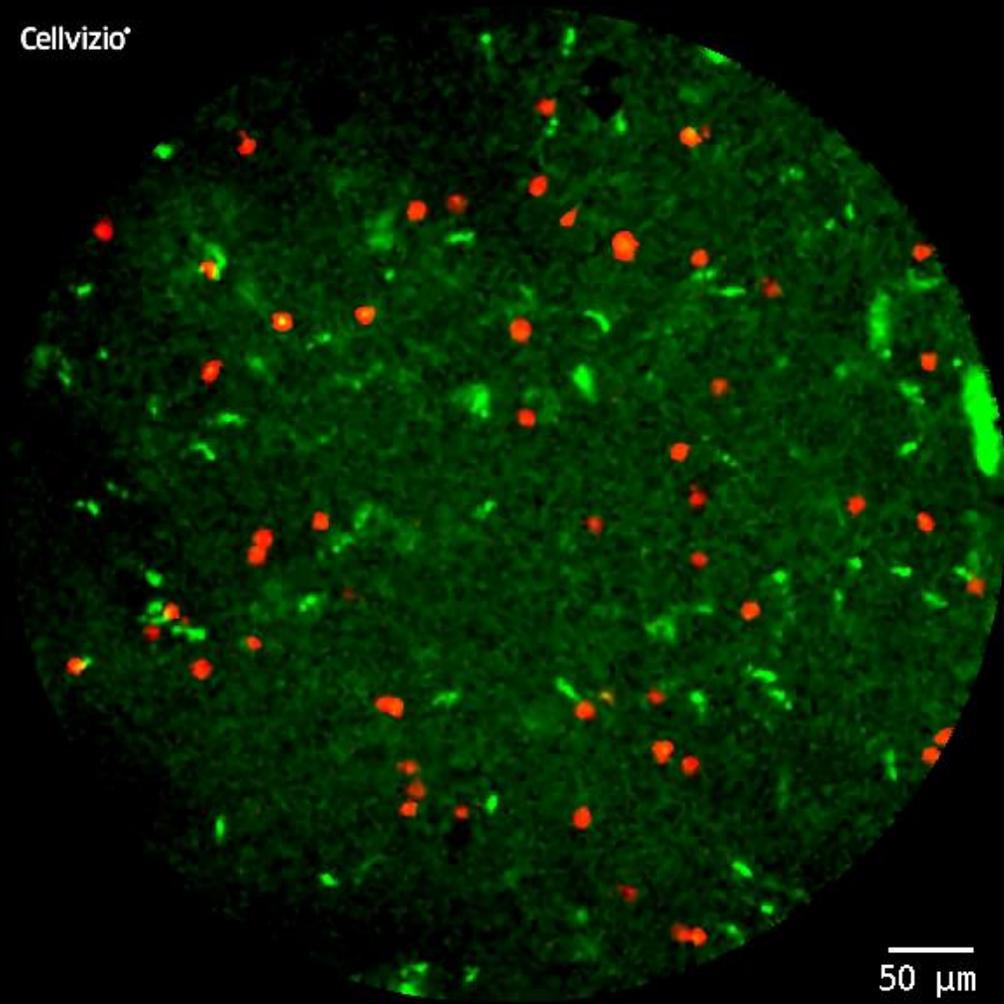
Site of semen deposit
after mating

- Deposit of horse semen during mating takes place in the cervical side of the uterus.
- Sperm found in the oviduct 2h after AI (Bader, 1982)
- Most spermatozoa are eliminated from uterus 4h after AI (Katila, 1995).
- The process of elimination starts 1h after AI (Katila, 2000)
- Transit is expected to be the result from sperm mobility and uterine contractions.

Imagerie in vivo des spermatozoïdes chez la jument

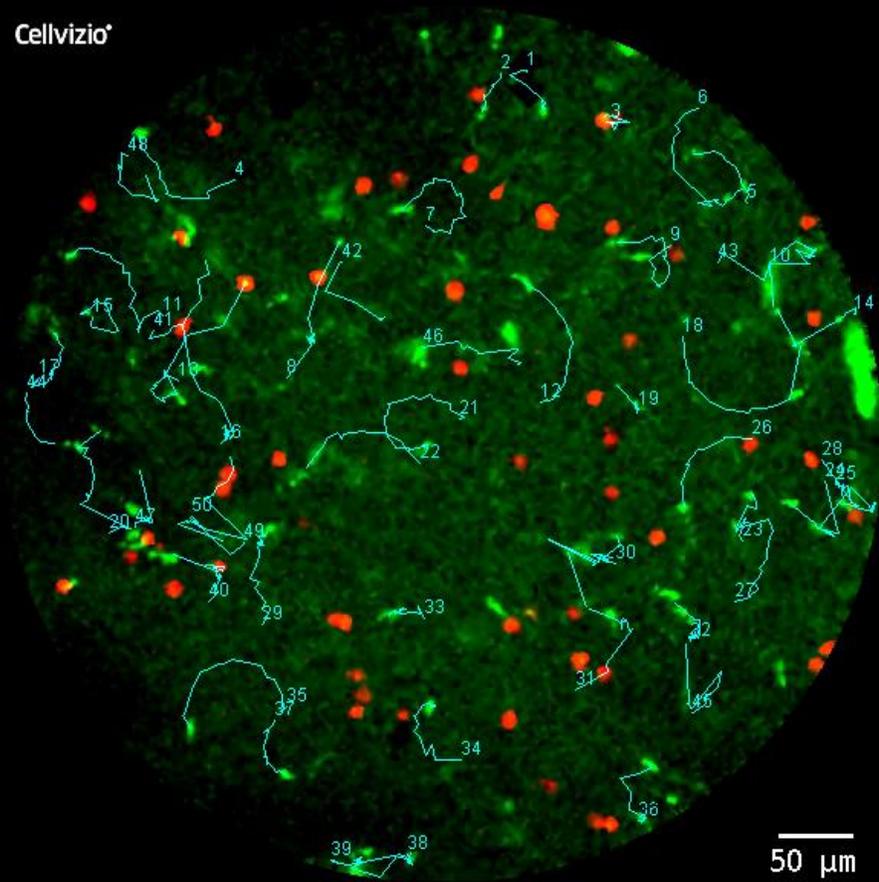


Cellvizio®

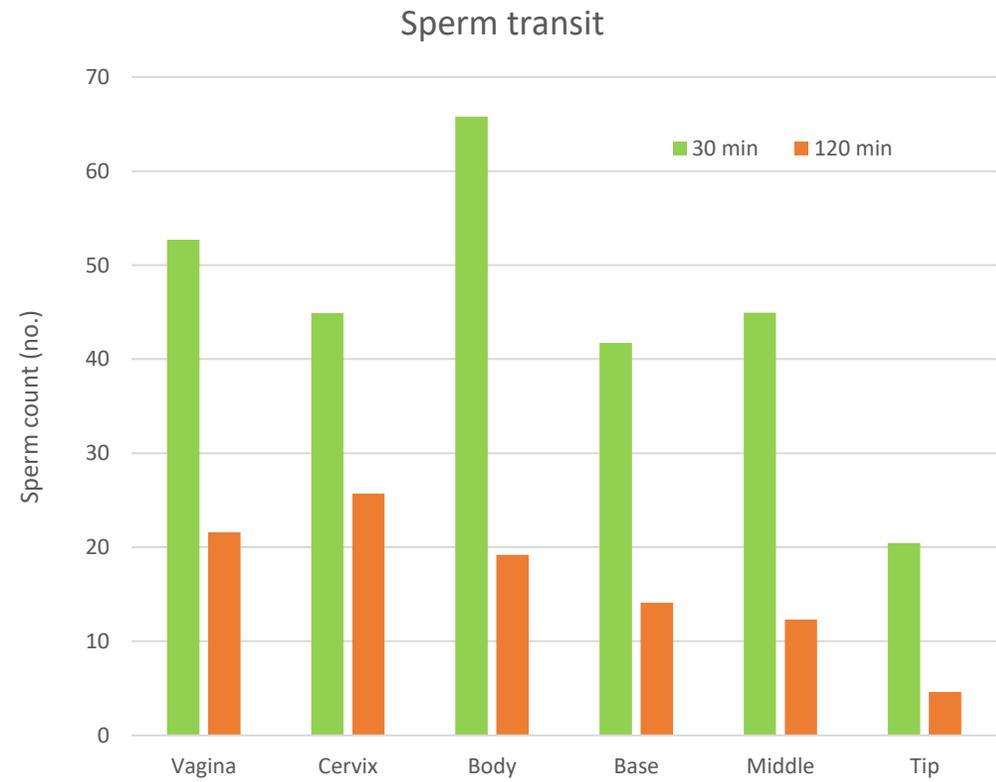
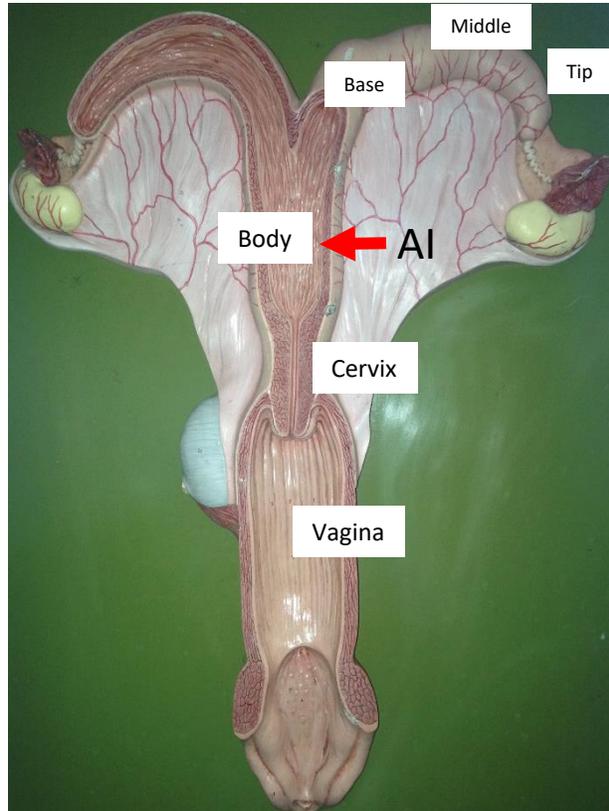


50 μm

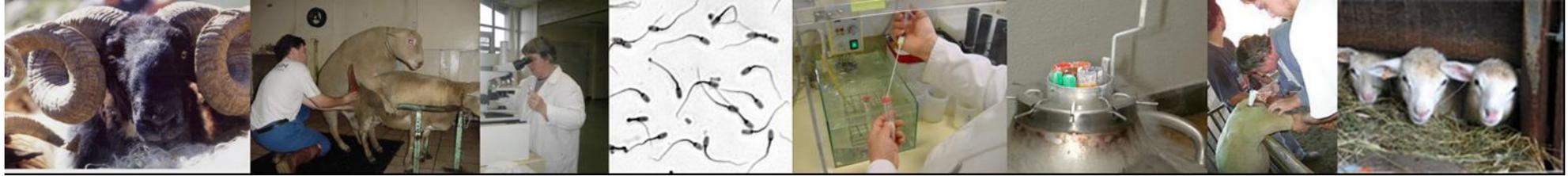
Cellvizio®



50 μm



Site de dépôt
de la semence



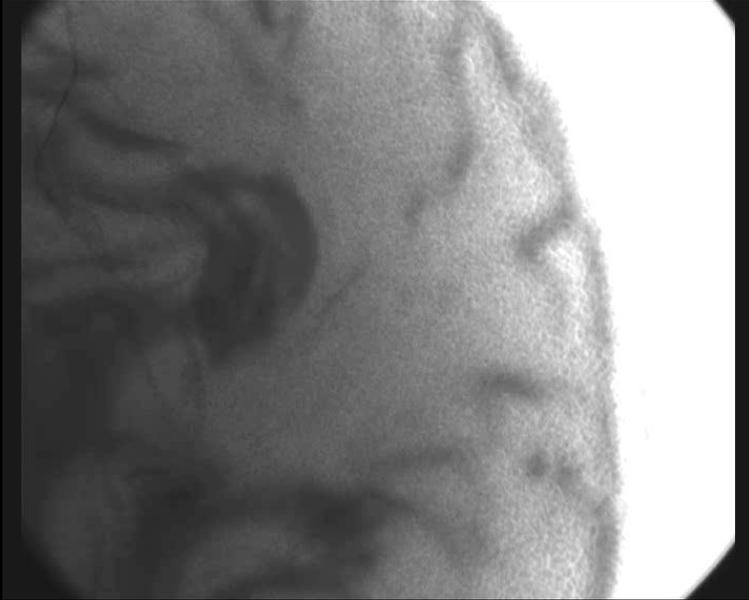
Motilité massale

- sperme pur
- lame tiédie
 - dépôt d'une goutte
- observation des vagues
 - très rapidement
- échelle de 0 à 5
 - 0 immobilité totale
 - 1 mouvements individualisés
 - 2 mouvements très lents
 - 3 motilité massale générale de faible amplitude
 - 4 motilité massale rapide sans tourbillon
 - 5 motilité massale rapide avec tourbillons

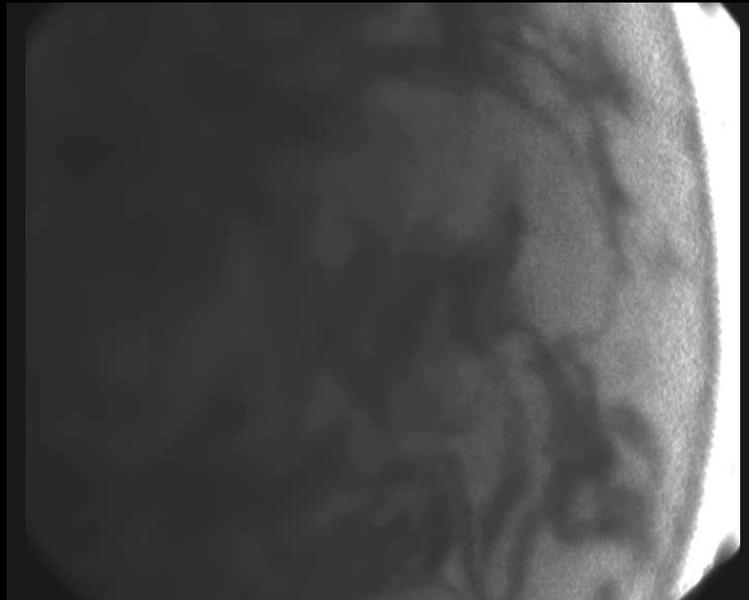


Mobilité massale chez les ovins

MM = 3



MM = 4



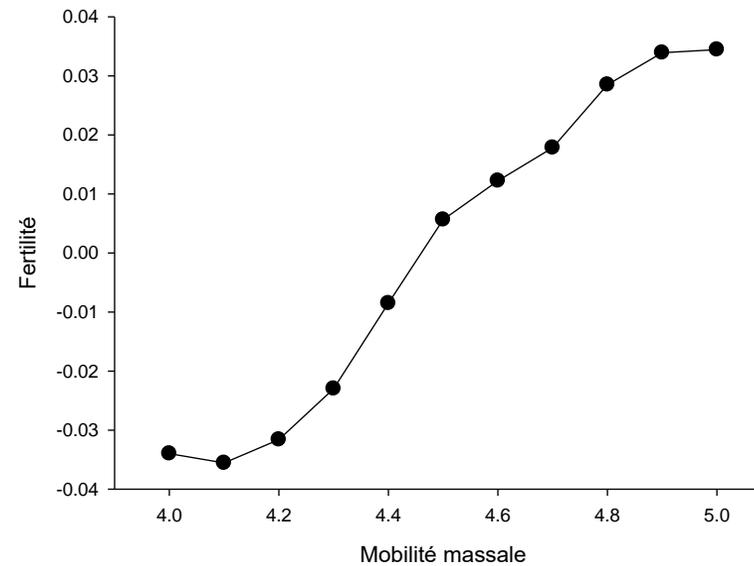
MM = 5



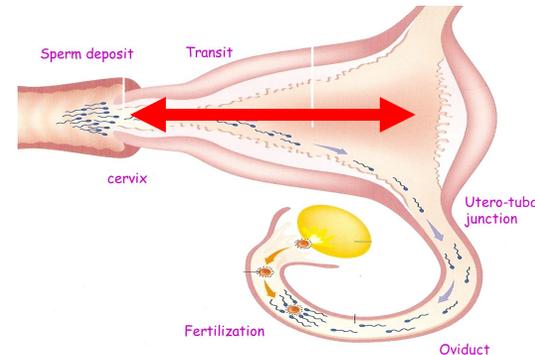
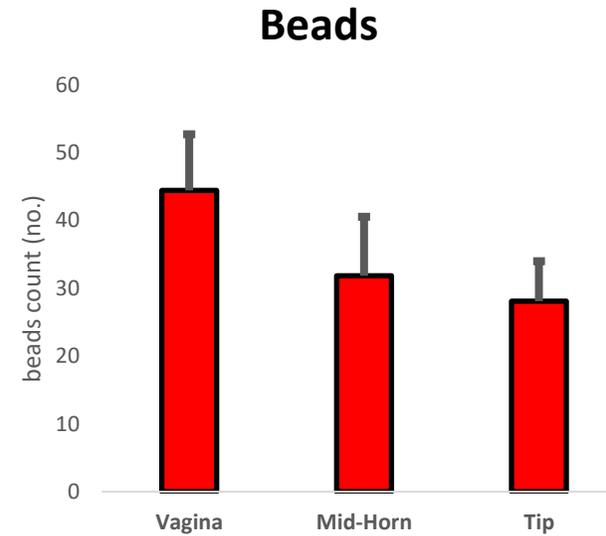
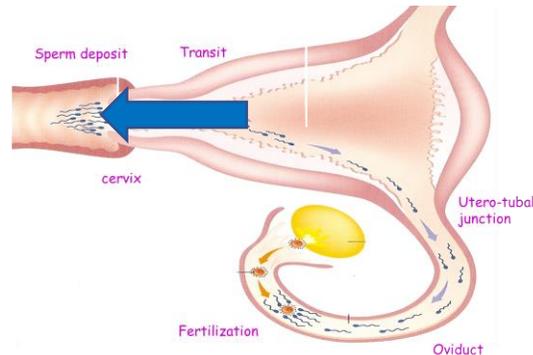
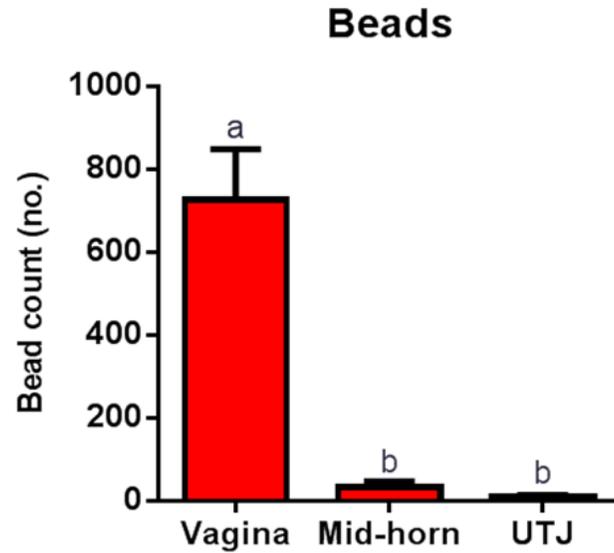
Mobilité massale et fertilité chez les ovins

- Grille de notation subjective beaucoup plus fine dans les CIA entre 4 et 5
- Traduit la vitesse de rotation des tourbillons

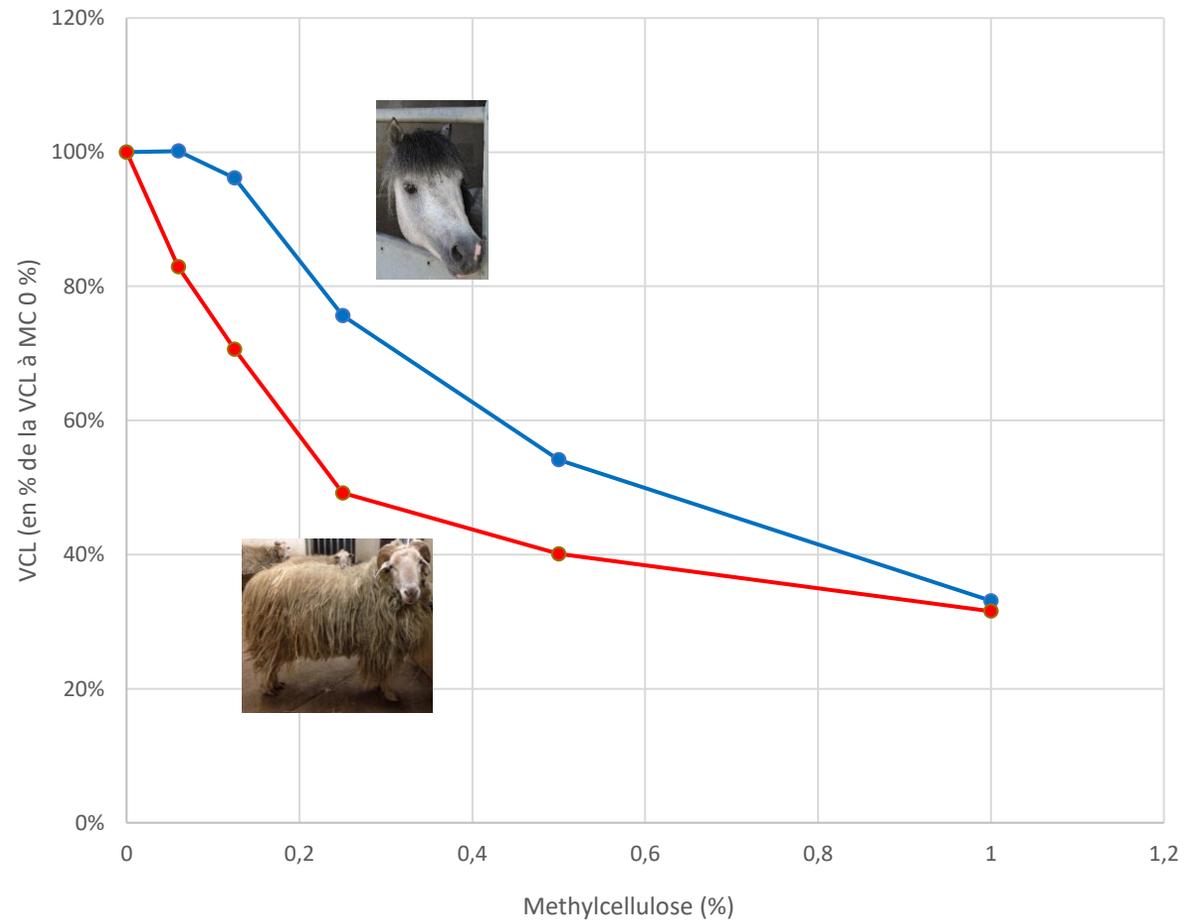
Mobilité massale de la semence
et fertilité chez les ovins

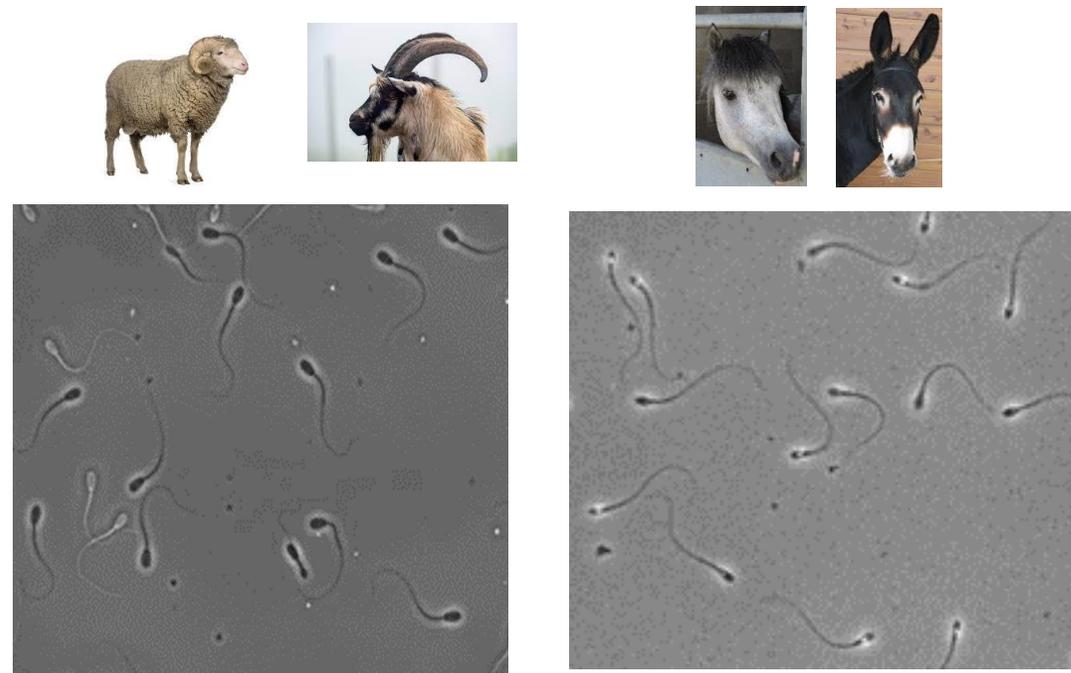
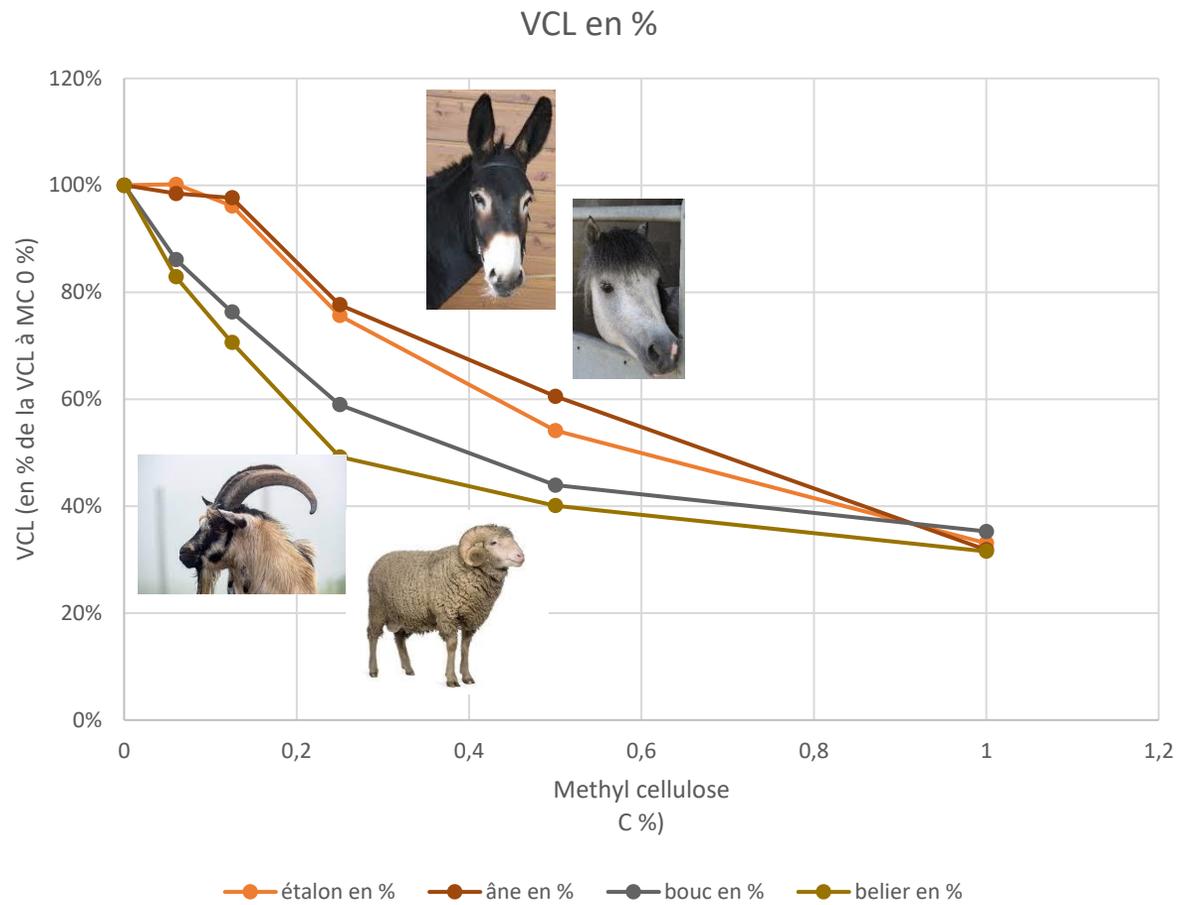


La mobilité des spermatozoïdes est elle utile ?



Viscosité du milieu et mobilité des spermatozoïdes



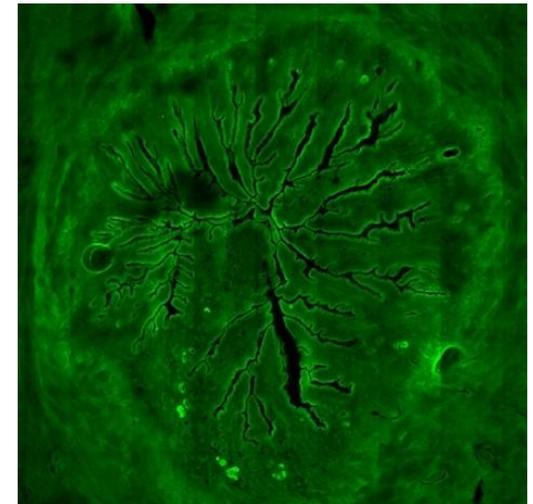
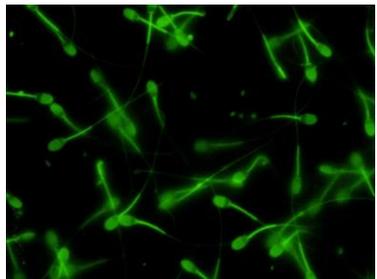


La morphologie de la tête explique t-elle la mobilité en milieu visqueux ?

Conclusion



- Anatomie du tractus génital femelle et site de dépôt de la semence variables selon les espèces
- Stratégie de sélection des spermatozoïdes féconds variable
- Transit potentiellement expliqué par :
 - les contractions du tractus femelle
 - la mobilité des spermatozoïdes
 - La viscosité du milieu





Merci pour votre attention