



Building and testing a rumen function sensor: RUFUS

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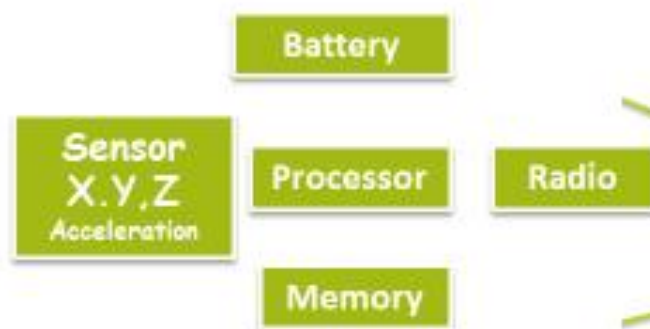
RUFUS project

- Development of a rumen pressure sensor bolus
- Collaboration between Strathclyde University and Universitat Autònoma de Barcelona
- Commencing Spring 2020
- Technology development and *in vitro* testing in Scotland
- Fistulated-cow *in vivo* testing in Spain



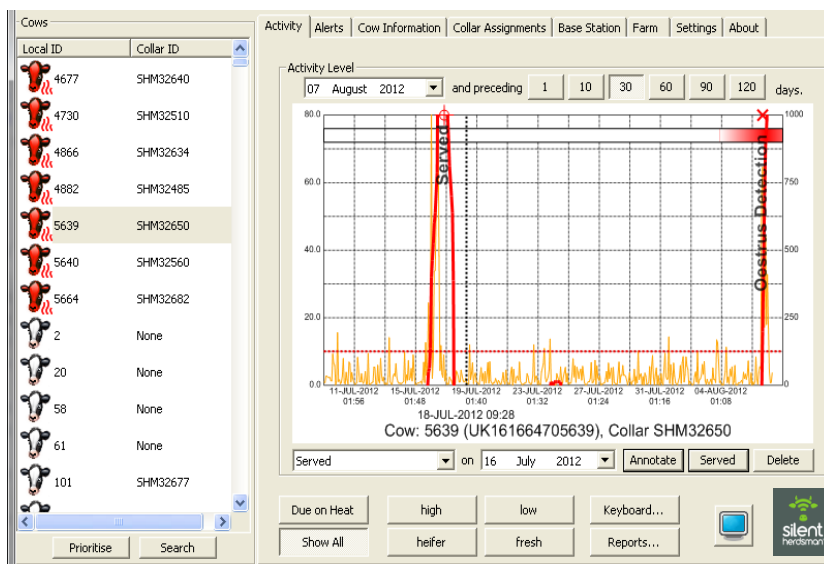


We have a lot of experience with sensors.
Strathclyde have developed the "Silent Herdsman" accelerometer collar for estrus detection

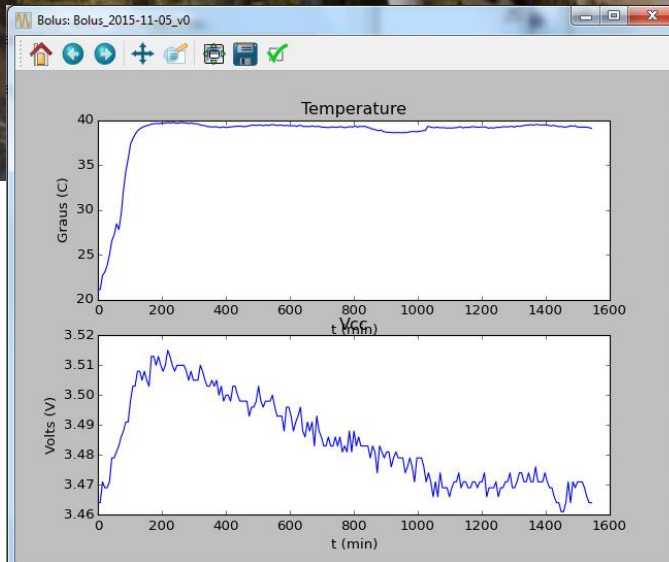
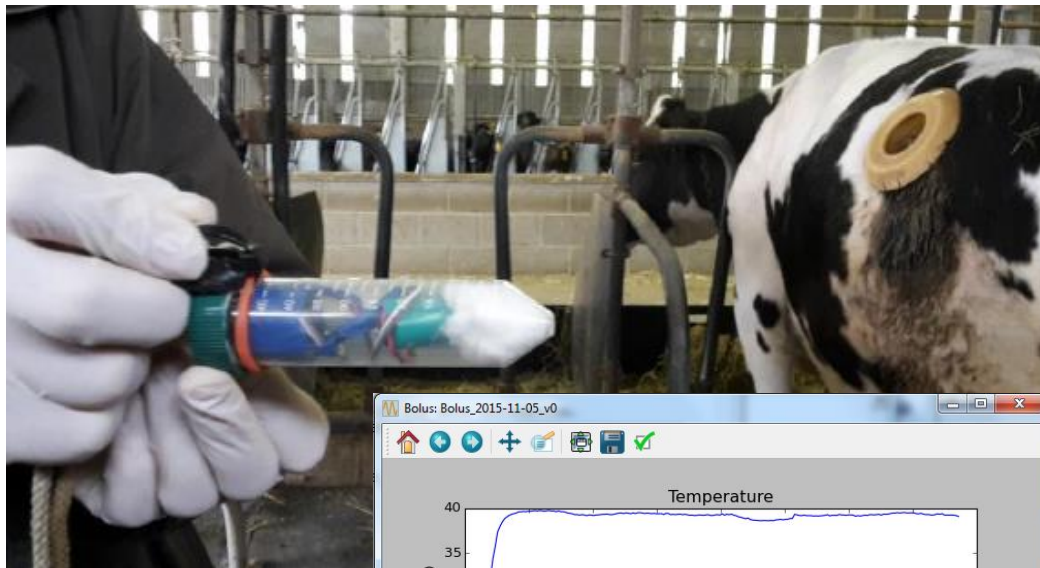


Location for Collar Sensor

Weight



Barcelona have developed the "BioSens" rumen bolus for temperature measurement in cows, sheep and goats



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Rumen fermentation

Rumen fermentation provides most of the cows energy and protein

Low pH disrupts fermentation....

And
METHANE!

Solution:
measure
pressure
contractions

By knowing pH we can optimise feeding

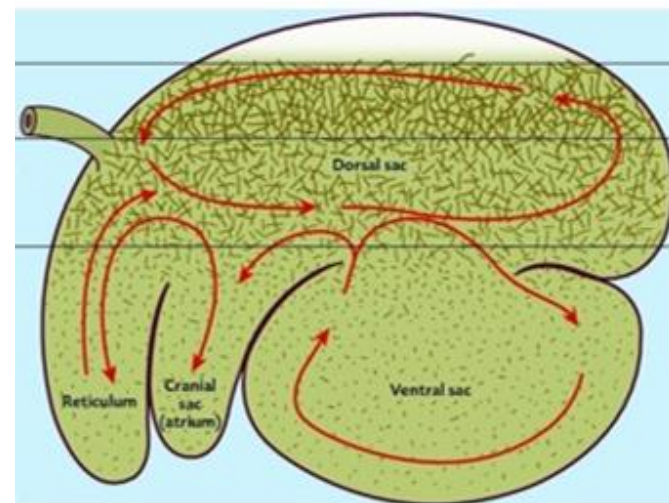
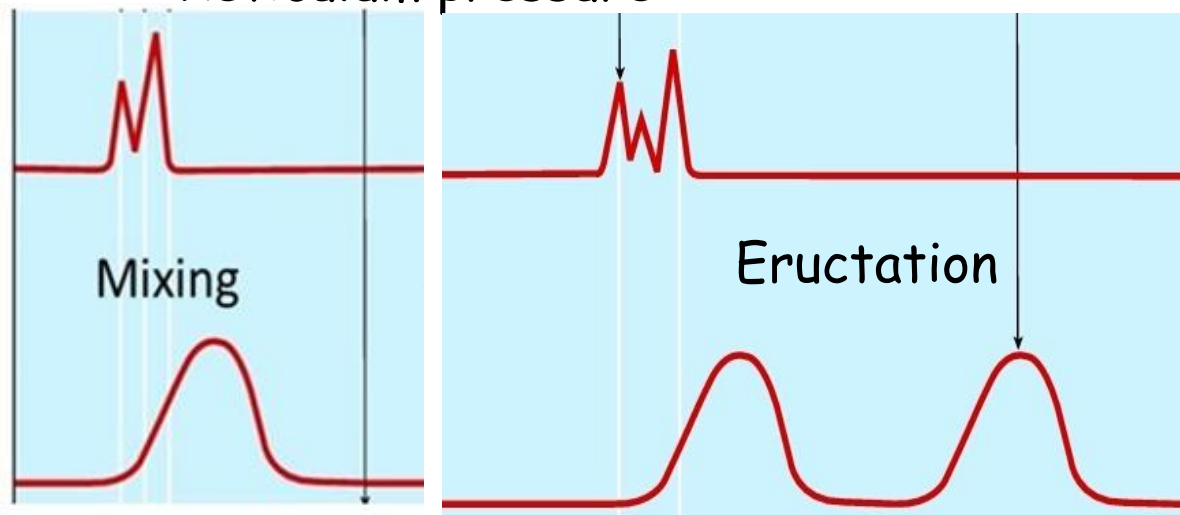
Problem:
pH sensors are expensive and have a short life



Rumen motility

Muscular contraction of the reticulum and then rumen creates distinctive pressure waves

Reticulum pressure



Rumen pressure

- Regurgitation contraction (reticular triplet): rumination
- Eructation contraction (ruminal doublet): methane production

Rumen pressure sensing

The ability to constantly monitor rumen pressure provides:

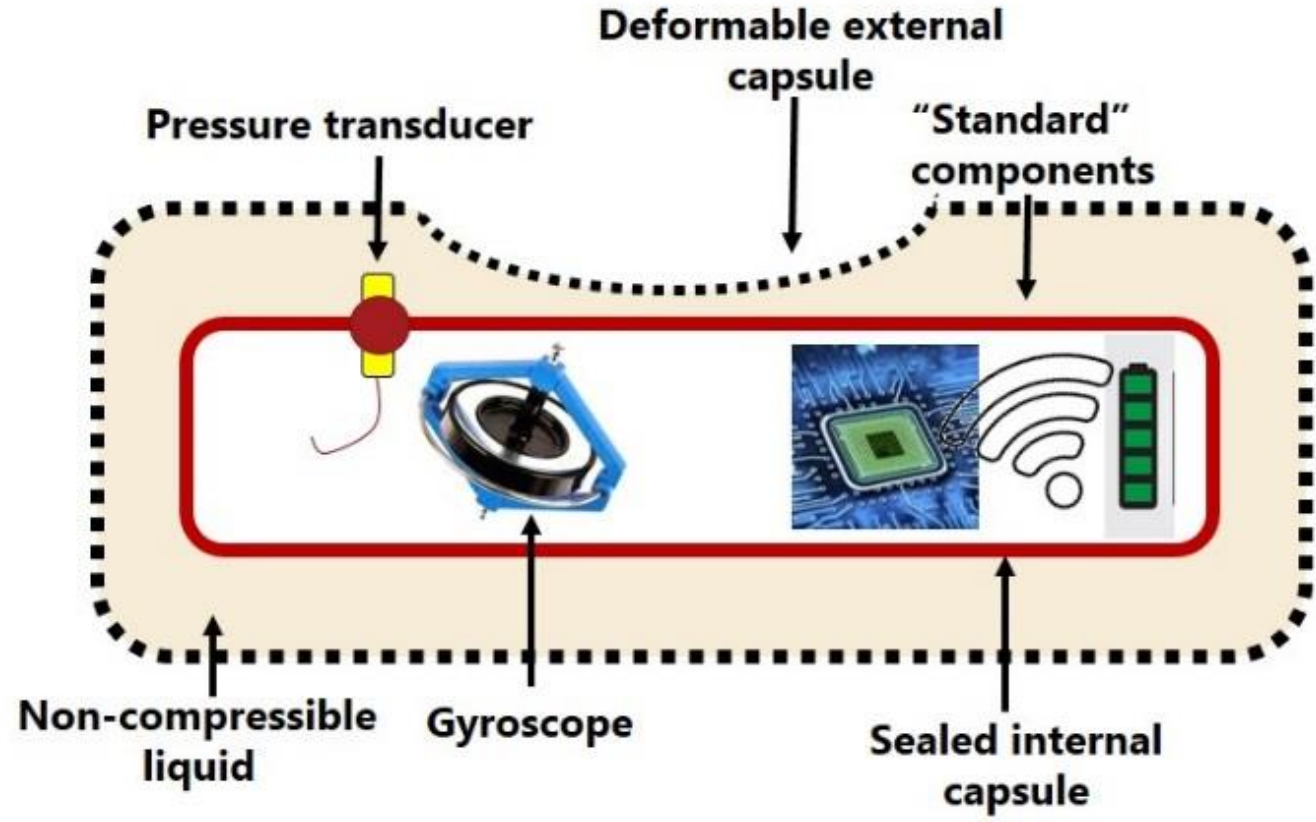
- Confirmation of normal rumen function
- Confirmation of normal rumination
- Quantification of methane output
- *Early diagnosis of sub-optimal function*

Rumen function is a veterinary diagnostic "first response"
And monitor this automatically
will be extremely useful.





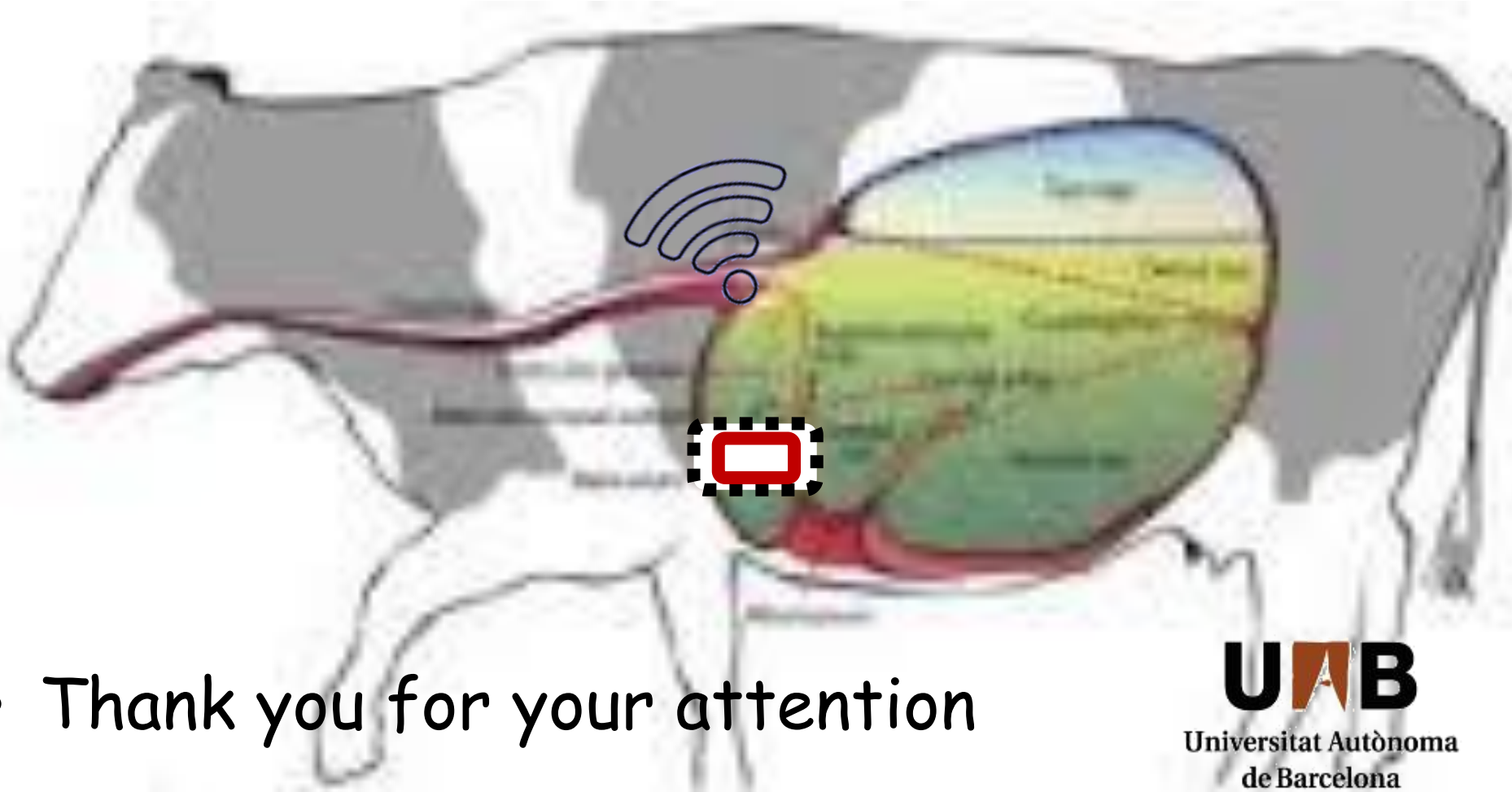
Proposed RUFUS sensor prototype



- Gyroscope for recording rotations to add data relating
- Deformable fluid-filled external capsule
- Rigid internal capsules with electrical components
- Measure of pressure, recording reticular and protruding pressure sensor contractions



Questions?



- Thank you for your attention
- Now we can ruminate: Questions?

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