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Continuous surveillance of pigs in a pen using learned based segmentation in computer vision

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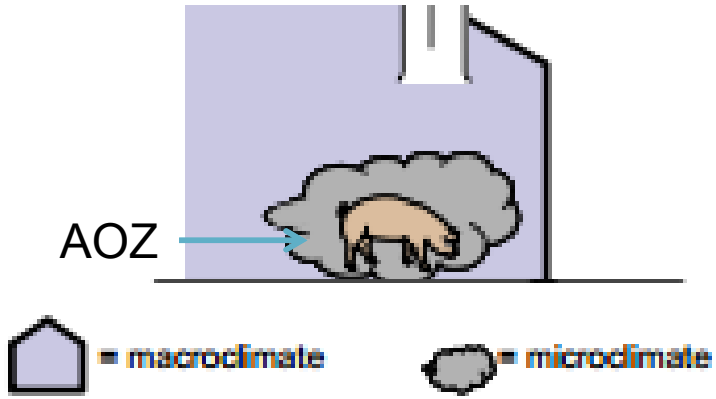
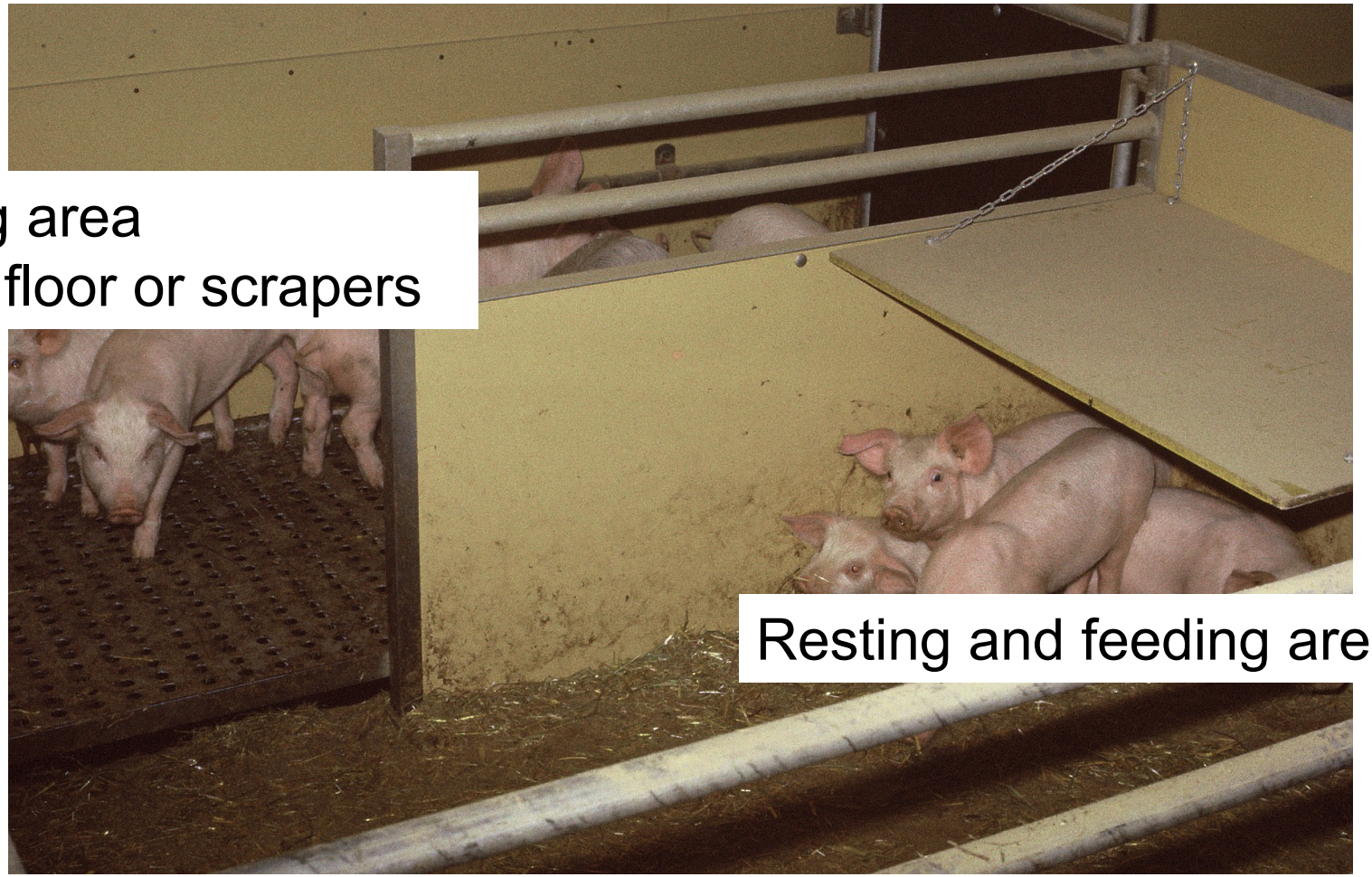


Introduction

- The environmental temperature microclimate in the Animal Occupational Zone (AOZ) is an important part of pig housing
- Heat load will result in a response in pig behaviour – wallowing, also in dung
- Safeguarding the climate and thus animal welfare in a pig pen includes a well functioning ventilation

The (Swedish) pig pen – 2 areas



Dunging area
drained floor or scrapers

Resting and feeding area

Bad climate – bad hygiene

Too warm:

- More pigs in the dunging area (to wallow, cooler)
- Also other explanations; sickness, avoidance of group mates..

Aim of study

- Explore segmentation methods of pigs in 2 areas of a pig pen in normal and practical conditions including light, surfaces, bedding, shadows, animals.
- Suggesting a new method of image segmentation for the use in continuous monitoring and controlling climate in the pig pen based on the location of pigs in the pen, according to the principles of Precision Livestock Farming (PLF)

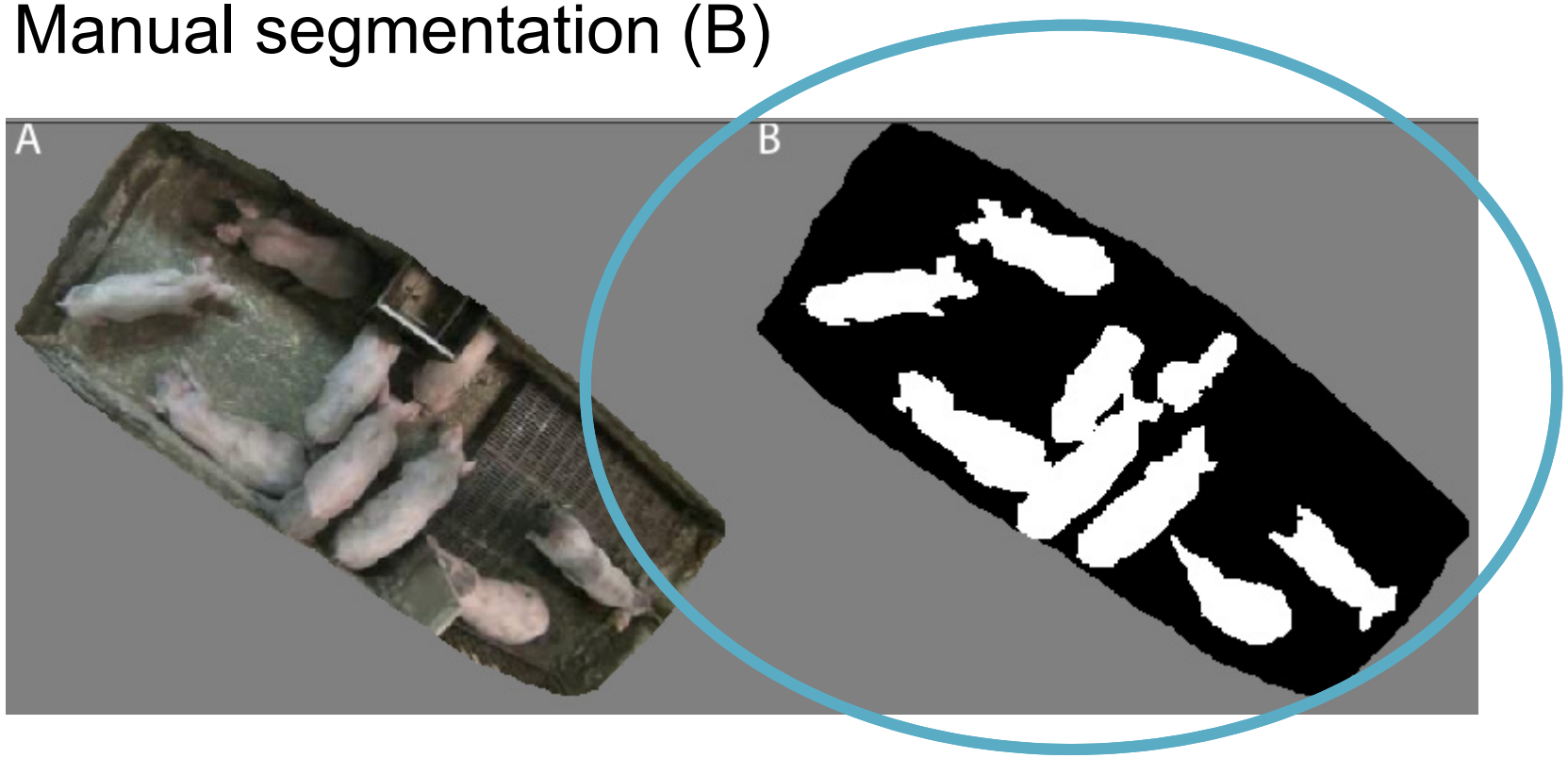
Material and methods

- 9 young pigs in a 2 area (solid/slatted floor) pen
- Top down view Axis M-3006 camera 640 x 480 mjpeg video
- Two 10 min videosessions
- Manually marked a Region Of Interest (ROI)
- Explored and developed segmentation methods

Region of Interest (ROI)

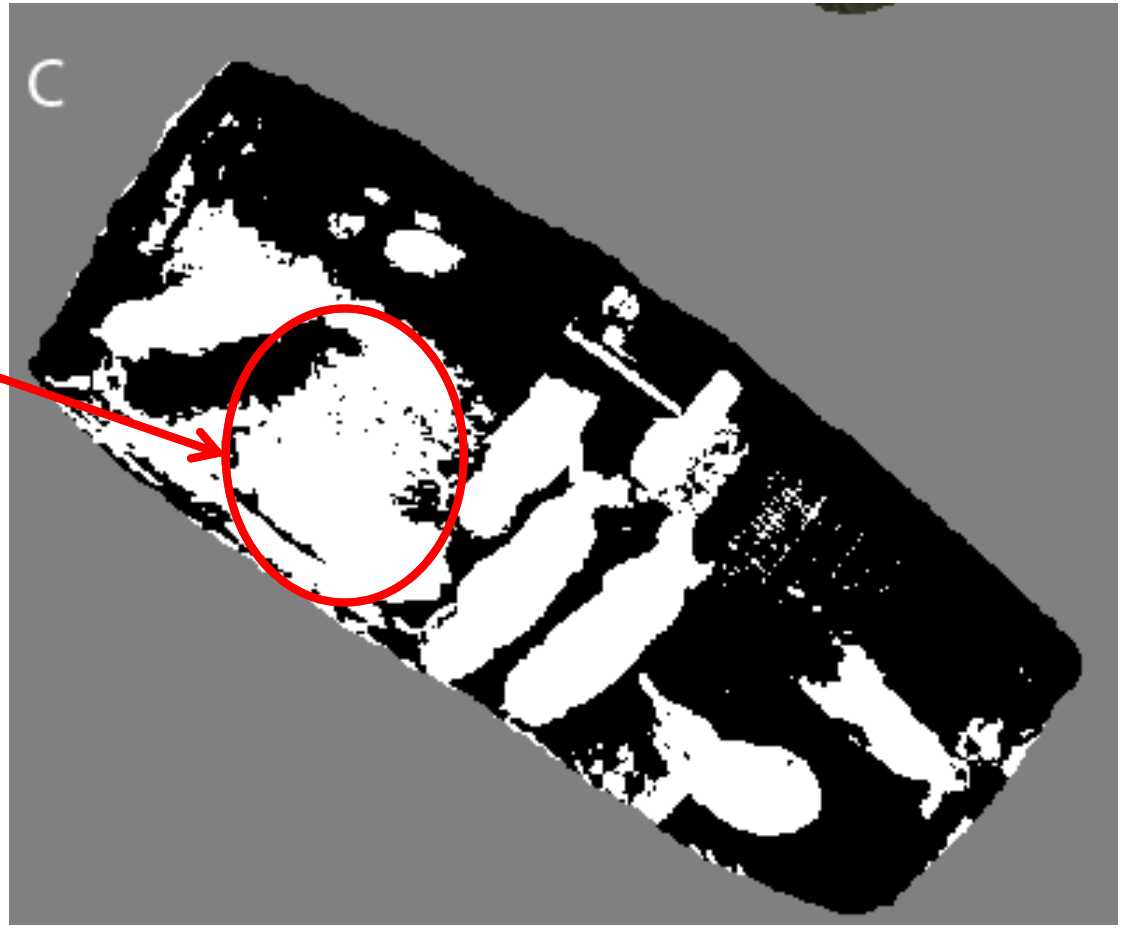
Segmentation exploration

- Manual segmentation (B)



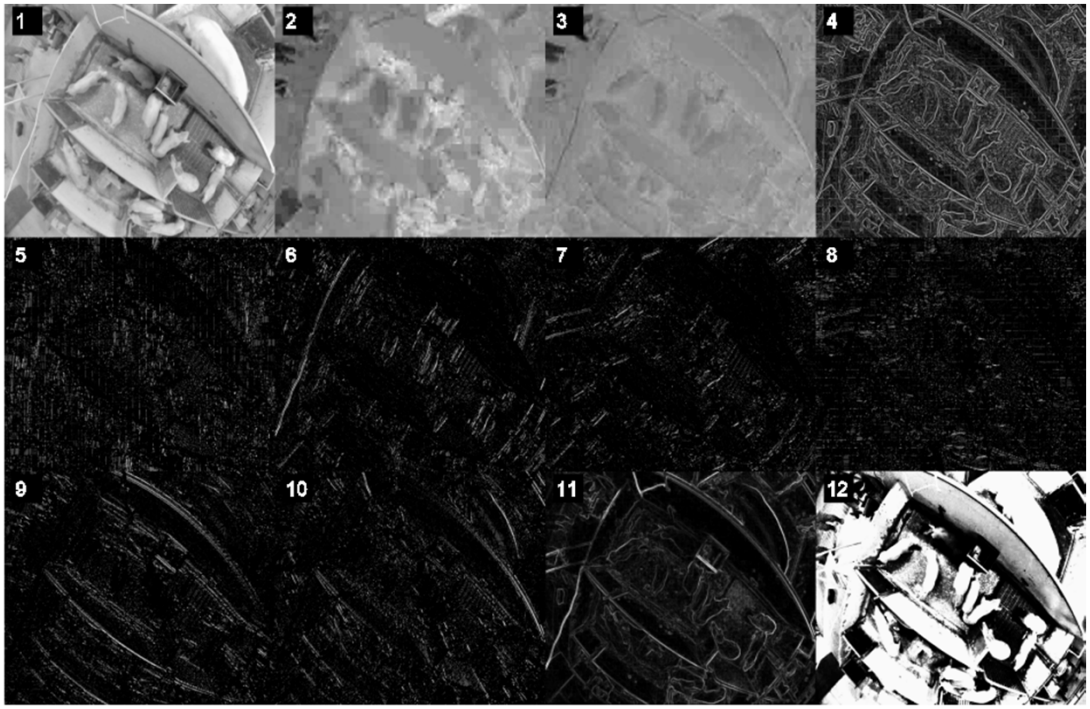
Greyscale segmentation Otsu (1979)

Pig or straw?

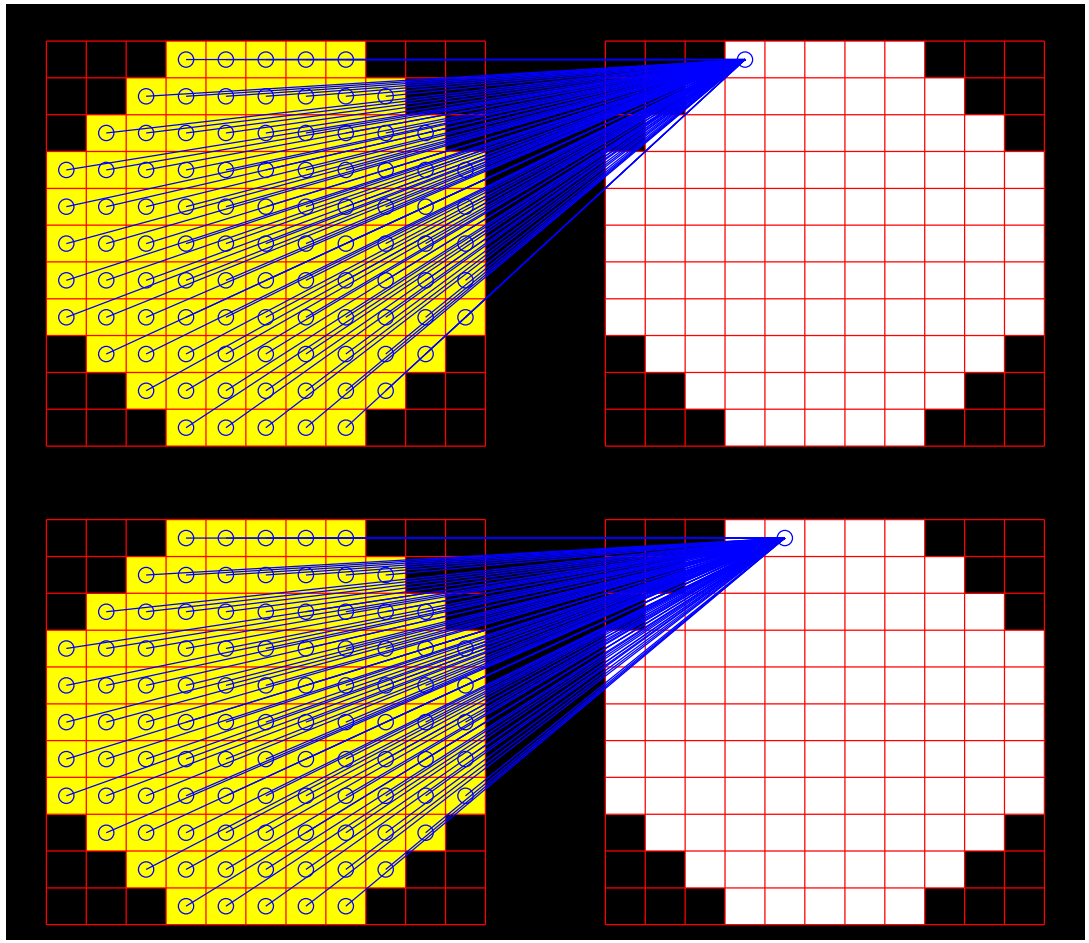


Learning Based Segmentation and Indicator

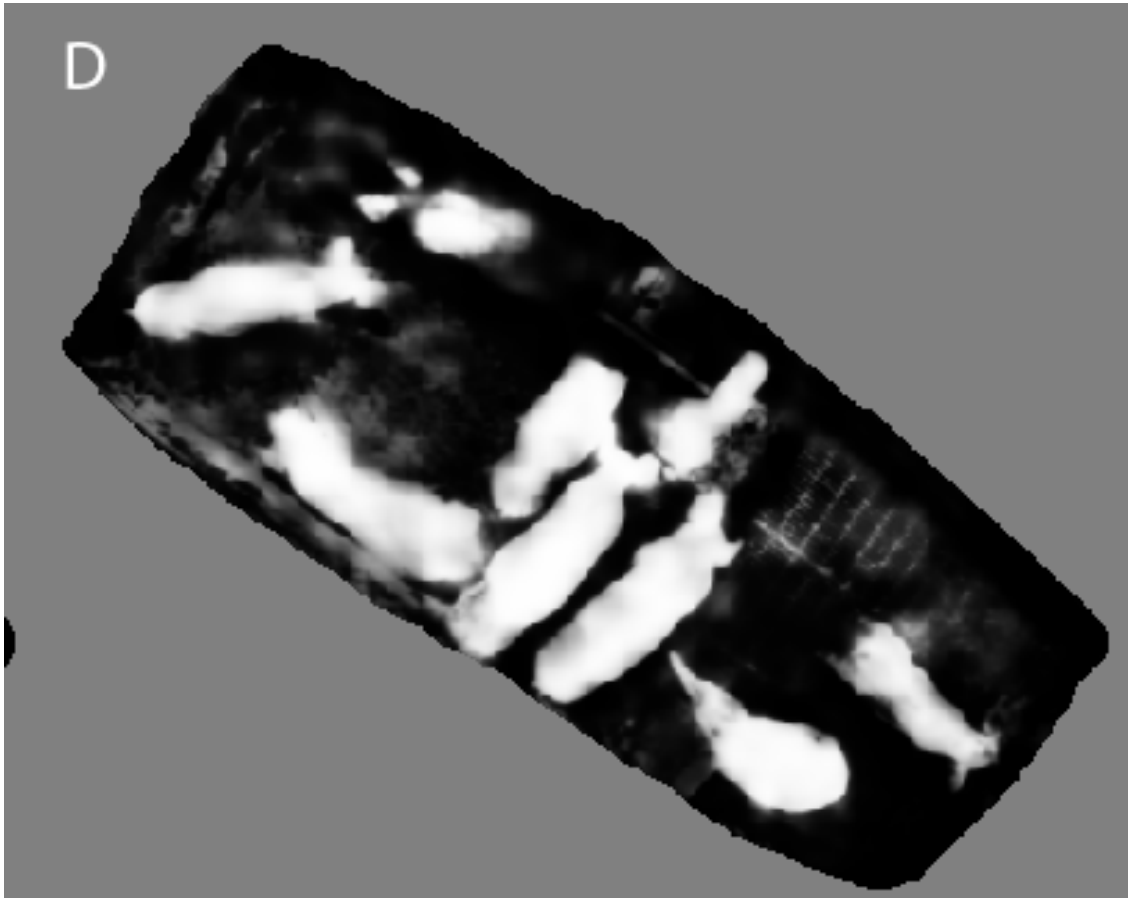
- 10 frames were manually segmented
- Utilised ten channels plus 2 additional channels



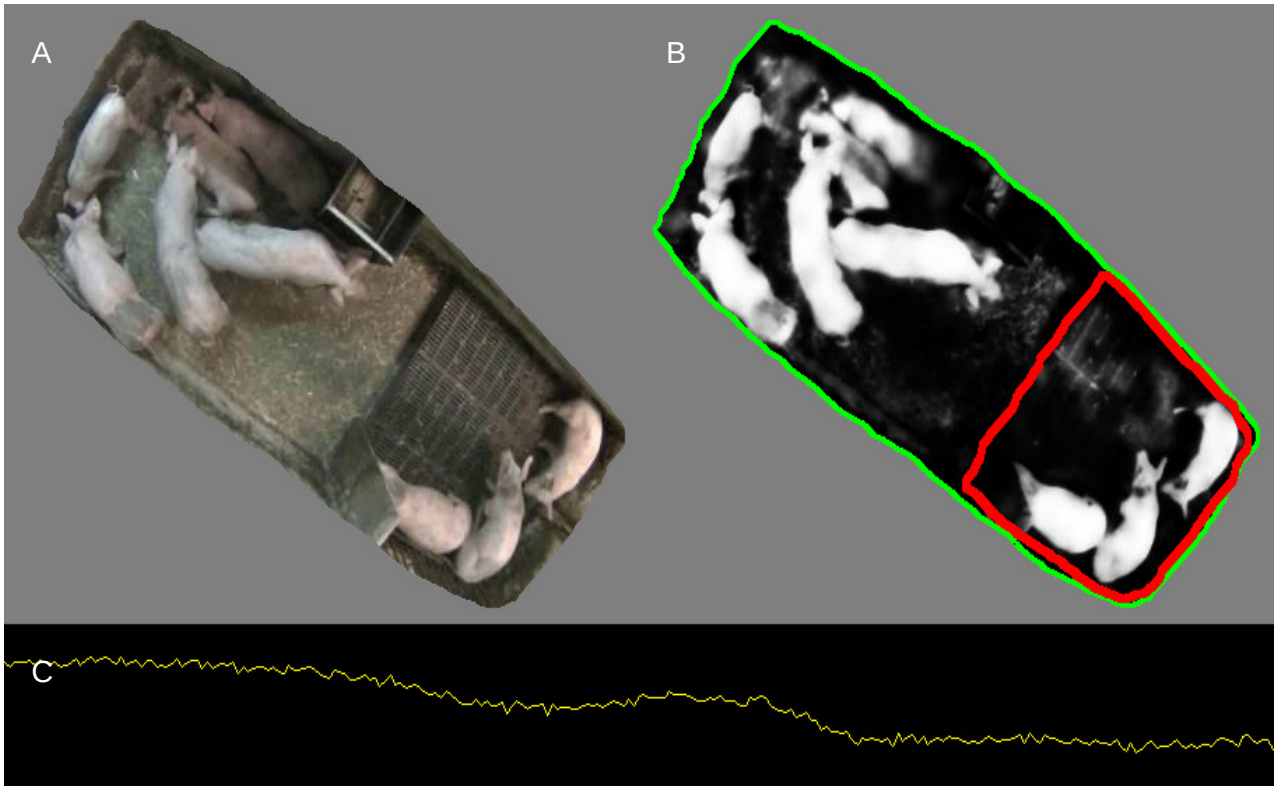
Produce segmentation information – output area of probalilities



New output area of probabilities, repeated for every pixel



Continuous automatic estimation of the pigs' locations in different parts of the pen



Conclusions

- Possible with a learning based segmentation, to extract pigs in a designated area, e.g. the dunging area – in a practical situation including straw and shadows
- Suggested to use to continuously monitor and control ventilation among other applications – e.g. early warning system as has been investigated för poultry (Kashiha *et al.,* 2013)
- More studies needed, longer periods and linking it to e.g. ventilation control
- Adopt to other species


Thank you for your attention