Cooling of fattening pigs during warm thermal conditions improves behavior and environment

A.-C. Olsson[1], K.-H. Jeppsson[1], A. Nasirahmadi[2]

[1]Swedish University of Agricultural Sciences, Department of Biosystems and Technology, P O Box 103, SE- 230 53 Alnarp, Sweden

[2]University of Kassel, Department of Agricultural and Biosystems Engineering, Nordbahnhofstr. 1 a, 37213 Witzenhausen, Germany

- PigSys, a project within the ERA-NET SusAn

- Overall aim is to develop a decision support system for optimal climate control in the house to raise fattening pigs in a more animal-friendly and resource-efficient way.

- http://pigsys.eu/

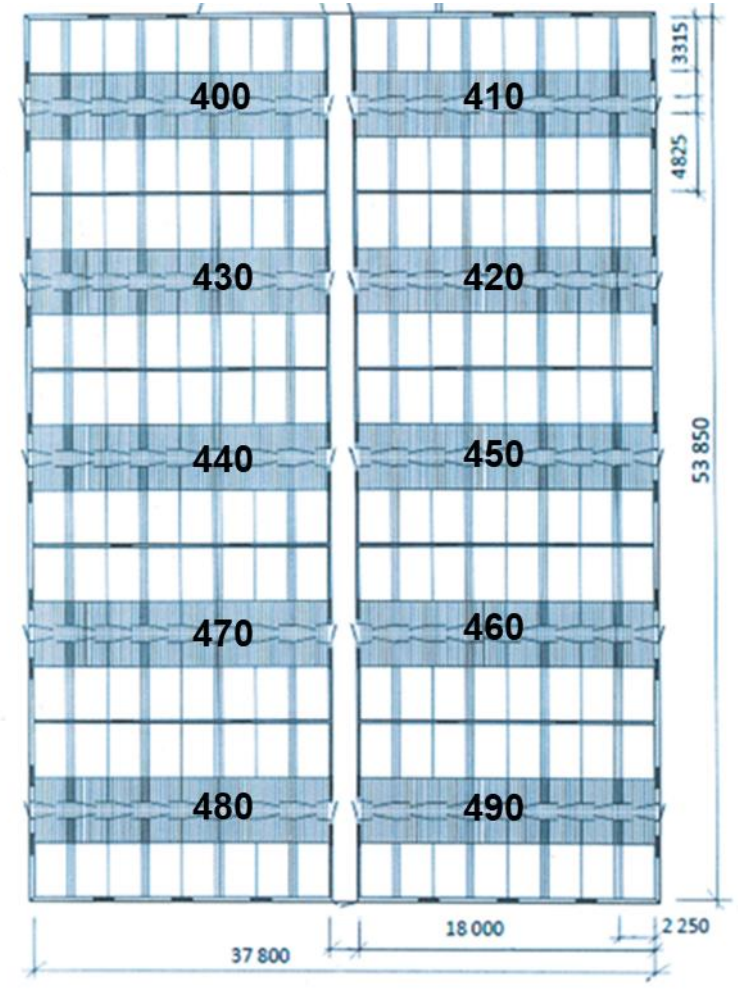
UNIKASSEL VERSITÄT · Freistaat Thüringen Thüringer Landesanstalt für Landwirtschaft · SEGES · INRA SCIENCE & IMPACT · ifip Institut du porc · Newcastle University · SLU

WP 5 (Sweden): Cooling of fattening pigs during warm thermal conditions

Test technical solutions for improving pen hygiene (and reduce ammonia emission) in partly slatted pens for growing-finishing pigs:

- Cooling of pigs by **showering** of low-pressure water above the slatted floor
- Cooling of pigs by **redirecting air flow** to the lying area (convective cooling).

Research facility- commercial herd



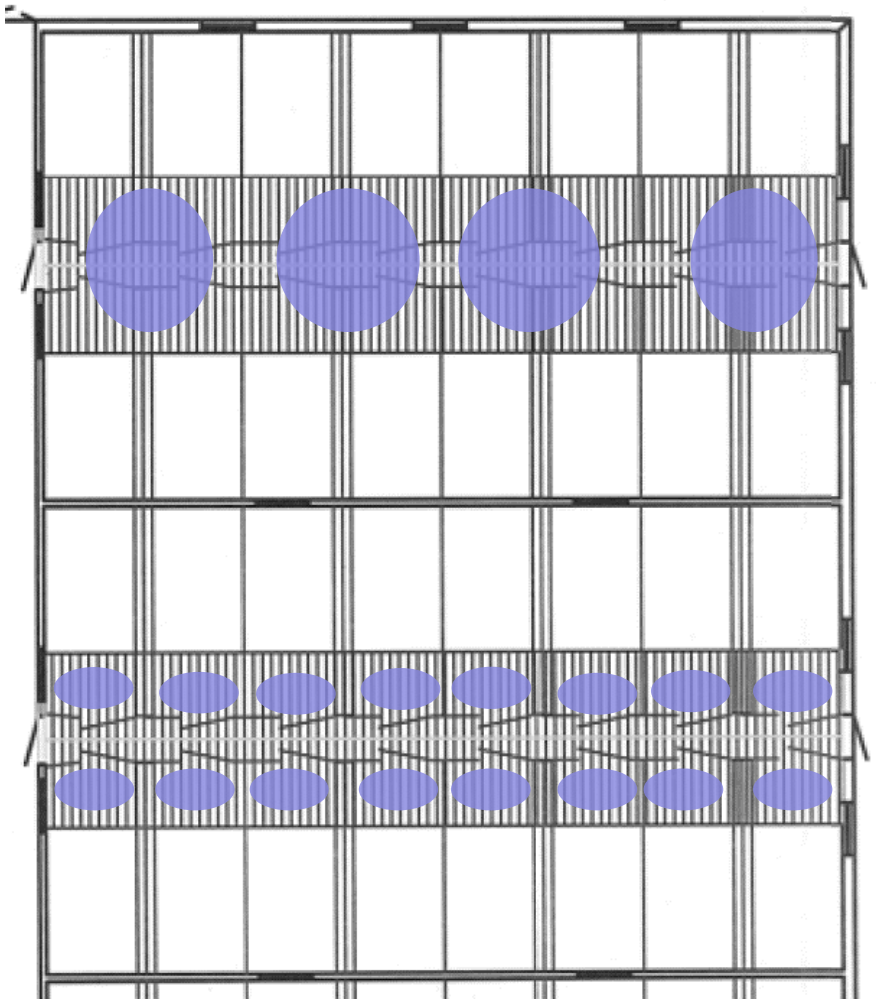
Research design

Treatment		Batch	Month of introduction	Year	Compartments
Showering	Sprinklers/Control	11	January	1	440 /450
		12	February	1	460 /470
		13	March	1	400 /410
Showering	Nozzles/Control	**21**	April	1	420 /430
		22	May	1	440 /450
		23	July	1	480 /490
		24	Apr	2	400 /410
Redirected air	Redirected air/Control	31	August	1	400 /410
		32	March	2	480 /490
		33	May	2	420/430
		34	June	2	440/450
		35	July	2	460/470
		36	August	2	480/490

Showering

1. **Sprinklers**
   1 sprinkler per 4 pens

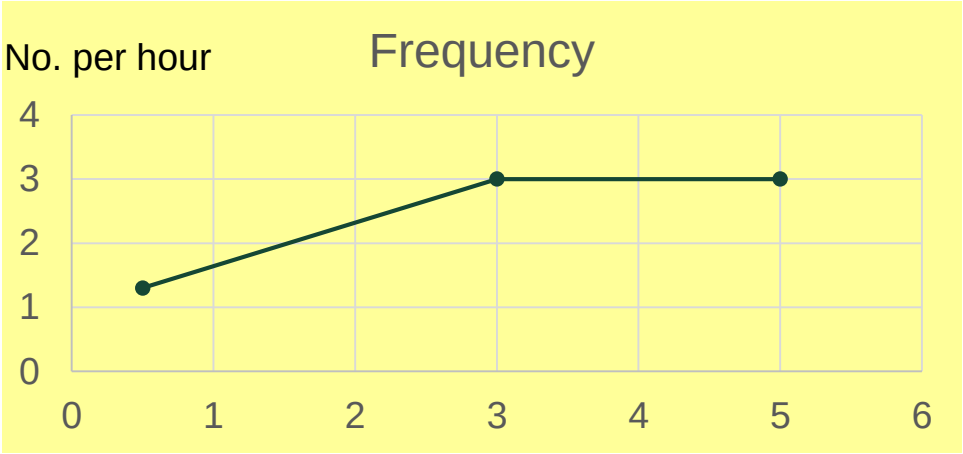
2. **Nozzles**
   1 nozzle per pen



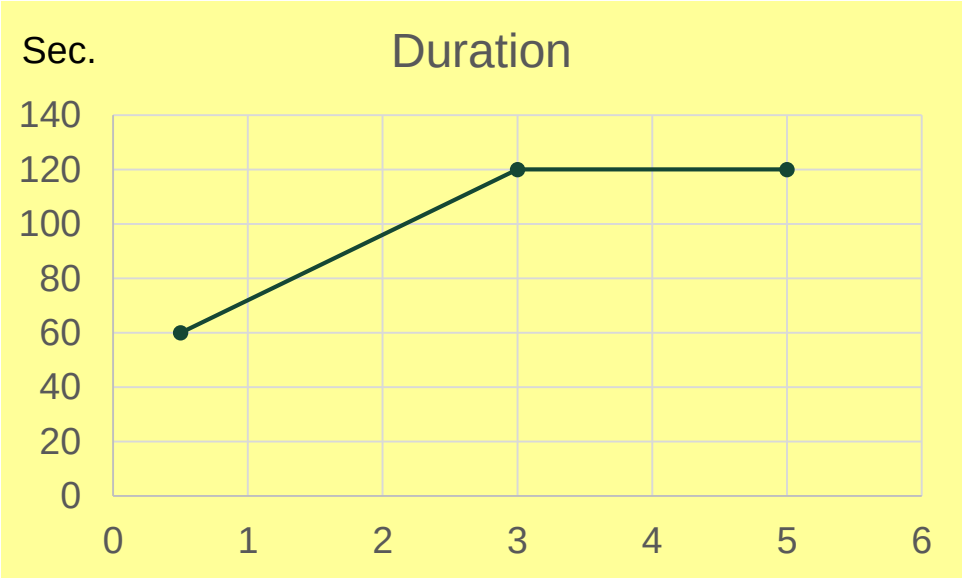
Showering is controlled by the ventilation system (SKOV)

Climate for Growth

Day after introduction	Set temperature, °C
1	19.4
7	19.2
14	19.0
21	18.5
42	18.0
56	17.0
84	16.5



Δ °C
Room temp-Set temp

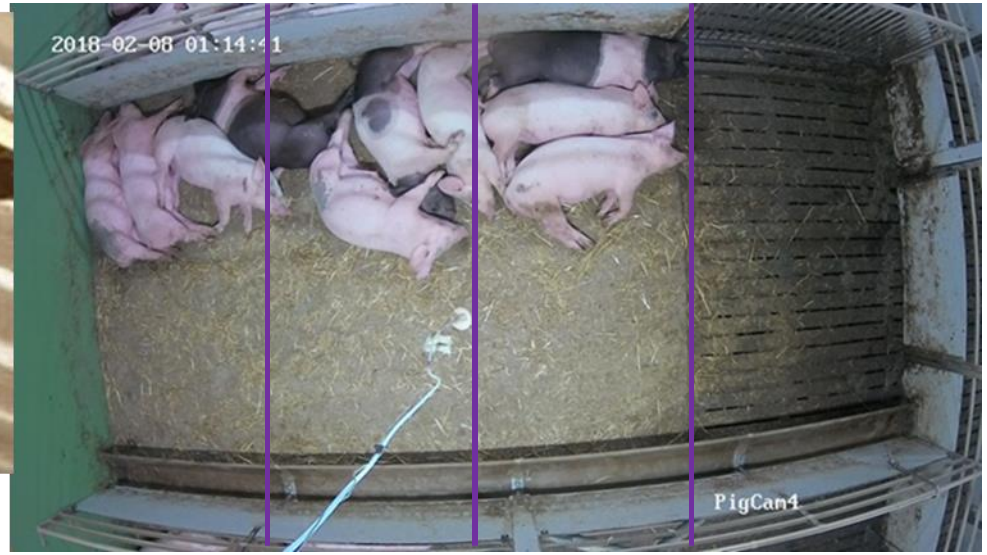


Δ °C
Room temp-Set temp

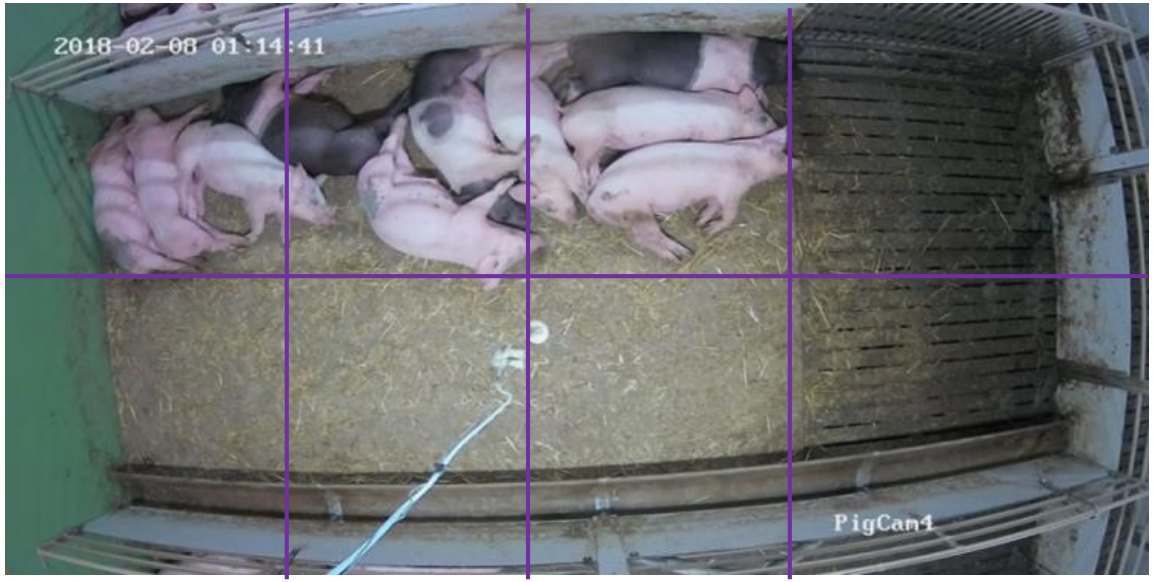
Evaluation-
Pigs' choice of occupation area in the pen?

Video cameras (2 pens per compartment) + image analysis (Nasirahmadi et al., 2019)
M1 (w3), M2 (w6), M3 (w9), M4 (w12)

HIK Vision DS-2CD2142FWD-I



Evaluation-
Pen fouling?

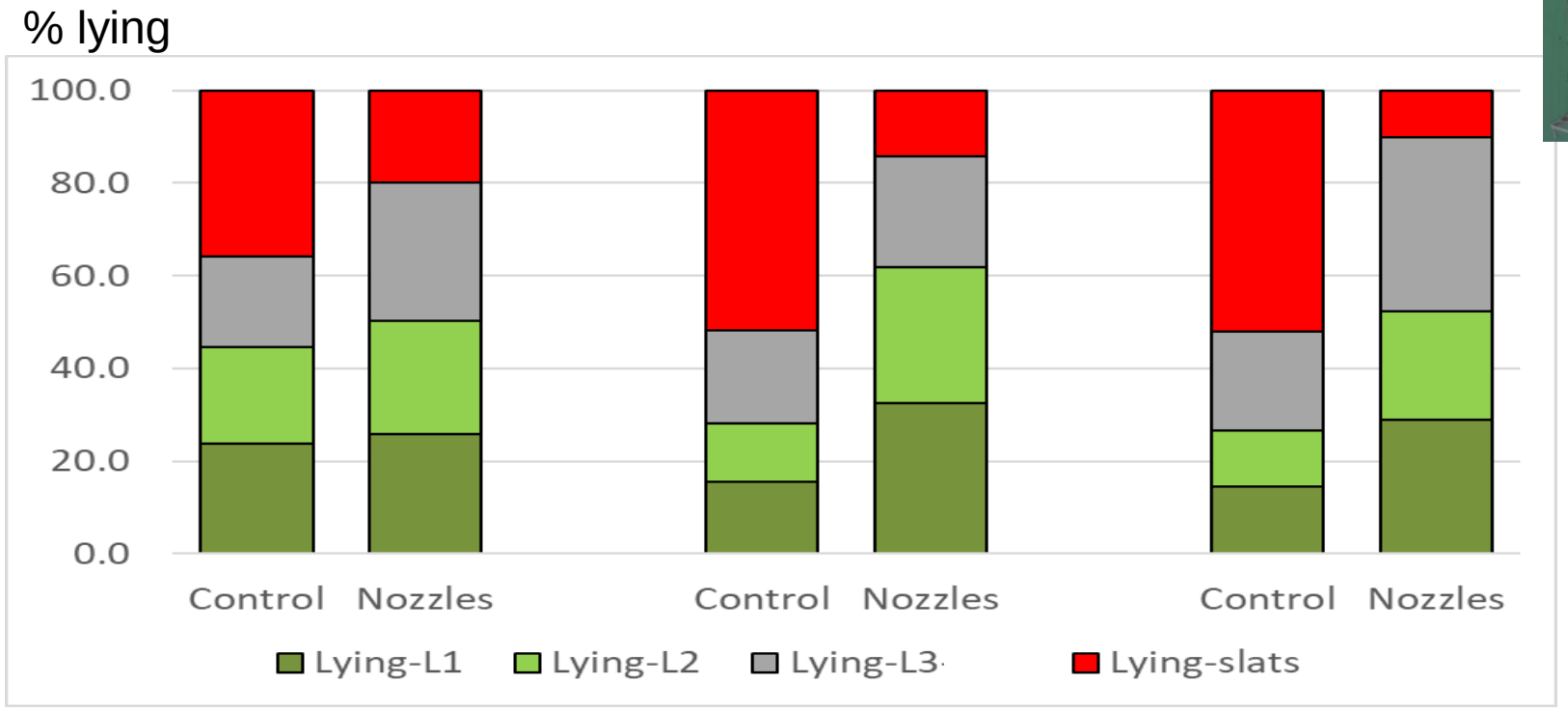


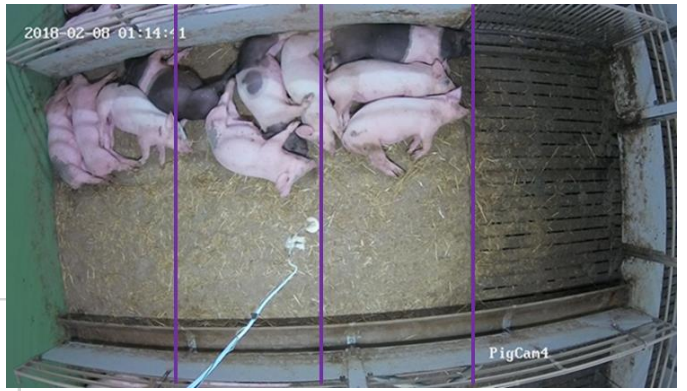
- Every week in all pens
- 8 areas are evaluated (6 in lying area and 2 in slatted area)
- Ocular studies according to a 7-degree scale (0=clean, 0.5, 1, 1.5, 2, 2.5, 3=completely fouled)

Evaluation-
Temperature, RH and ammonia emission?

Climate loggers and Photo-acoustic multi-gas analyser
M1 (w3), M2 (w6), M3 (w9), M4 (w12)

Results- occupation area in pen





L1 L2 L3 S

\+

image analysis

(Nasirahmadi et al., 2019)

Batch	21			22			23	
Temp,° C	21.1	20.5		22.9	22.5		21.4	21.0
Δ ,°C	3.8	3.2		5.7	5.3		4.2	3.8

Results- pen fouling

L1 L2 L3 S

Batch	**21**			**22**			**23**	
	Control	Nozzles		Control	Nozzles		Control	Nozzles
Temp,°C	21.1	20.5		22.9	22.5		21.4	21.0
Δ ,°C	3.8	3.2		5.7	5.3		4.2	3.8
Average L1+L2+L3	1.13	0.56		1.54	0.82		1.58	0.66
Relation	2.0			1.9			2.4	

Results- ammonia emission

	21			22			23	
	Control	Nozzles		Control	Nozzles		Control	Nozzles
Temp,°C	21.1	20.5		22.9	22.5		21.4	21.0
Δ ,°C	3.8	3.2		5.7	5.3		4.2	3.8
NH_3-emission, g/pig and day	6.95	5.0		6.19	2.7		6.76	4.2
	-28%			-56%			-38%	

Preliminary conclusions

Showering of low-pressure water above the slatted floor results in

- Improved lying behaviour
- Improved eliminative behaviour
- Improved pen hygiene
- Decreased ammonia emission
- Increased water consumption

Thanks for listening!

Acknowledgements:
Funding organizations of the SusAn ERA-Net project PigSys
All partners in the PigSys consortium
Owner of the commercial pig house

Contact:
anne-charlotte.olsson@slu.se

Swedish University of Agricultural Sciences, Department of Biosystems and Technology, P O Box 103, SE- 230 53 Alnarp, Sweden

SCIENCE AND EDUCATION FOR SUSTAINABLE LIFE