PURDUE UNIVERSITY

CAPSTONE/SENIOR DESIGN EXPERIENCE 2019

Hog Cooling Pad System

Agricultural & Biological ENGINEERING

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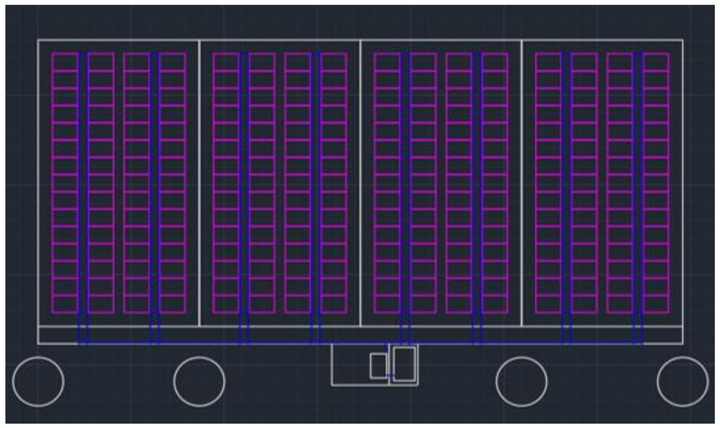
Background:
- After years of research Purdue teams have developed a cooling pad to be used in farrowing buildings that can lower discomfort of the sows and potentially increase productivity.

Problem Statement:
- Purdue Animal Science and ABE need a system for their Hog Cooling Pad project that recycles the warm water from the cooling pads instead of discharging it as waste.

Cooling Pad

Criteria:
- Design a closed system that recirculates the water
- Design should be available for both new and existing buildings
- Choose from a variety of given systems

Impact:
- Reduce sow loss
- Increased sow feed intake
- Increased pig wean weight
- Potential decreased of weaned pig loss



Proposed barn design for 240 crates

Future Validation Tests:
- Place three temperature sensors on loop between pads
- Temperature sensor on entering and exiting pad water
- Flow meters on each pad

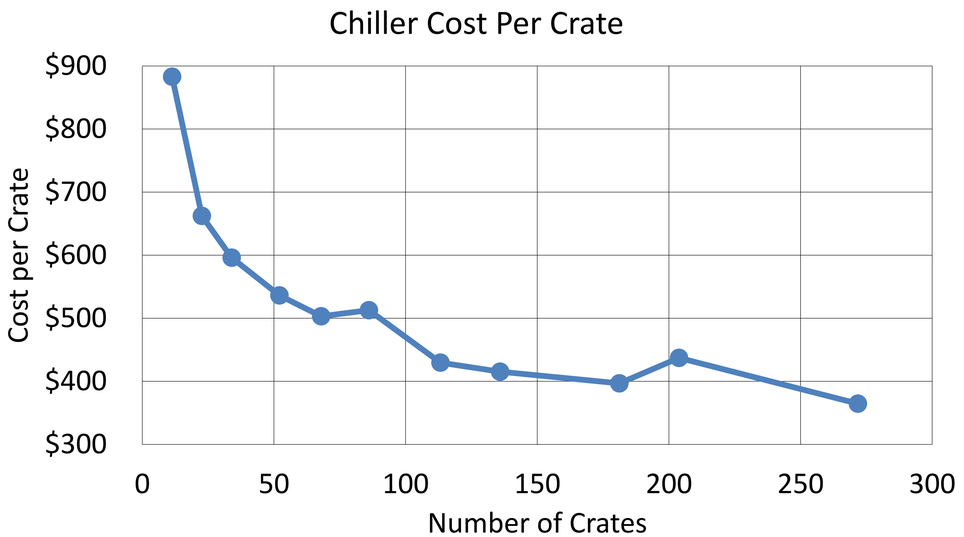
Decision Matrix

Solutions	Safety		Sustainability		Cost		Management		Viability		Score
Scores	0.1		0.4		0.1		0.3		0.1		
Vertical Geothermal	9	0.9	8.5	3.4	5	0.5	9	2.7	9	0.9	8.4
Horizontal Geothermal	9	0.9	8.5	3.4	8	0.8	9	2.7	9	0.9	8.7
Chiller	9	0.9	9	3.6	8.5	0.85	9	2.7	9	0.9	8.95
Pit Cooled	1	0.1	8	3.2	9	0.9	2	0.6	1	0.1	4.9
Peltier Chips	7.5	0.75	6.5	2.6	9.5	0.95	8	2.4	2	0.2	6.9

•Solution:
- Air cooled water chiller
- Most efficient and economical option
- Most easily placed in new or existing buildings
- Life span of 15+ years

Legacy Air Cooled Chiller

Economic Analysis:
- Average cost per pad- $280
- Chiller cost per crate - $376 (240 pads)
- If average piglet per litter increases by 0.5 pigs the system is financially viable
- Rate of return on system is 1-2 years with potential decrease in piglet loss
- System is not financially viable if increased sow longevity/ decreases sow loss are the only found advantages with the system



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