



K-STATE VETERINARY HEALTH CENTER



Intern: Gabrielle Maroulis
Major: Doctor of Veterinary Medicine
School: Kansas State University

Company background

Kansas State University Veterinary Health Center, or VHC, is a full-service veterinary teaching hospital that employs more than 50 veterinarians and 100 staff members. Each year, VHC provides routine, specialty and emergency veterinary services to more than 23,000 patients throughout the Midwest. Since its founding in 1906, VHC has conferred DVM degrees to over 7,000 veterinarians and has worked toward its mission to advance the health and welfare of animals, people and the environment.



Project background

KSU Veterinary Health Center partnered with K-State's Pollution Prevention Institute to host an intern under two EPA grants, one focusing on pollution prevention, or P2, and the other focusing on sustainable materials management, or SMM. As a result, the intern investigated opportunities in resource usage at the teaching hospital. The intern developed recommendations for each project and assessed their environmental and financial impacts.

Incentives to change

Healthcare facilities contribute to 4.4% of global net greenhouse gas emissions, as reported by Karliner et al. (2020). Despite substantial research on the environmental impact of human healthcare, a similar examination in the field of veterinary medicine has been lacking. Recognizing this, key VHC staff members decided to explore their hospital's environmental impact by identifying resource usage patterns and improvement opportunities. Relevant data could then be used to help develop coursework on environmental stewardship in veterinary practices.

PROJECTS REVIEWED FOR P2 AND SMM POTENTIAL

Water consumption investigation

Historically, VHC staff could not monitor departmental water usage patterns due to an absence of water meters. To identify water conservation opportunities, the intern installed meters on all major water sources in the VHC's large animal teaching hospital. By recording daily meter readings, the intern determined that the large animal teaching hospital consumes approximately 851,100 gallons per year at a cost of \$10,150. To conserve water, the intern recommended installing flow restrictors on hoses, conserving approximately 369,320 gallons per year and saving an annual \$4,400. The Veterinary Health Center plans to routinely monitor the water meters for at least one year to identify seasonal fluctuations.

Lighting audit

Of the 8,039 bulbs within the VHC lighting fixtures the intern analyzed, 93% were fluorescent, 0.76% were incandescent. The remaining 6.2% are LED and can be attributed to recent renovations. Accounting just for fluorescent lights, VHC currently uses 1,092,700 kWh per year at a cost of \$93,240. Since LEDs can provide the same level of light as fluorescent lights at higher efficiencies, the intern recommended all non-LED lights be replaced with 'plug and play' LED lights. If implemented, VHC could conserve 212,660 kWh per year, saving \$18,150 annually.

PROJECTS REVIEWED FOR P2 AND SMM POTENTIAL, CONTINUED

Sharps container audit

VHC disposes of used sharps in red, disposable sharps containers. By reviewing VHC's records, the intern determined that the teaching hospital generates 330 pounds of sharps waste per year. Purchasing the containers costs \$5,690 per year and disposal costs \$5,580 per year. To avoid unnecessary regulated medical waste, the intern researched replacing VHC's disposable waste containers with reusable containers. By comparing historical purchasing and disposal invoices to reusable container quotes, the intern determined that the cost of reusable containers exceeded the cost of the current practice by \$5,270 per year. Due to this cost, the intern did not recommend switching from disposal to reusable sharps containers; however, further research is warranted to identify other waste reduction opportunities.

Occupancy sensor investigation

The main building that houses VHC hasn't been fully modernized since its construction in 1975. As such, there are areas within the building without occupancy sensors. The intern placed HOBO data loggers in VHC's restrooms to estimate the amount of time lights were left on while not needed, which was determined to be 66% of the day. It was recommended that restrooms be renovated with occupancy sensors to conserve electricity. This recommendation could conserve 17,420 kWh per year at an annual savings of \$1,490.

SUMMARY OF 2023 P2/SMM INTERN RECOMMENDATIONS

Project	Annual estimated environmental impact	Estimated cost savings (\$/year)	Status
Water consumption investigation	369,320 gallons water 2.20 MTCO ₂ e	\$4,400	Recommended
Lighting audit	212,660 kWh 206.12 MTCO ₂ e	\$18,150	Recommended
Sharps container investigation	330 pounds 0.31 MTCO ₂ e	\$5,270	More research needed
Occupancy sensor investigation	17,420 kWh 16.89 MTCO ₂ e	\$1,490	Recommended
Total¹	369,320 gallons water 230,080 kWh	\$24,040	
GHG reductions^{1,2}	225.21 metric tons CO₂e		

¹Does not include projects "not recommended" or where "more research needed."

²EPA P2 GHG Calculator with Cost, 7 April 2016 & EPA WARM Tool - Version 15.1.