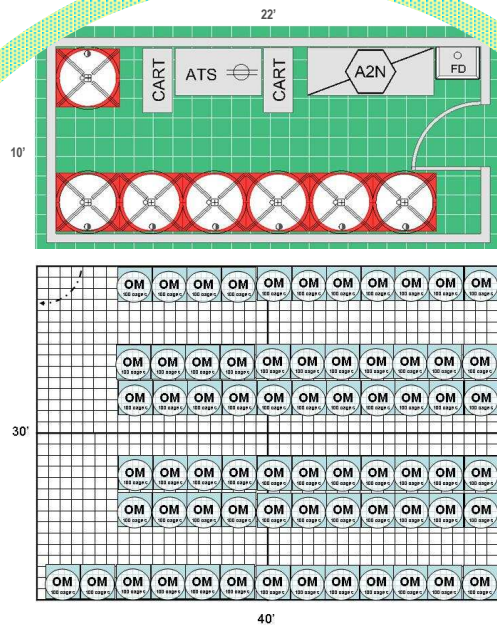


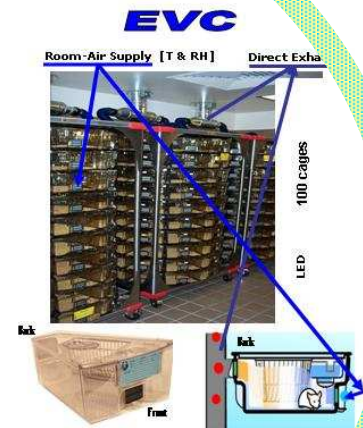
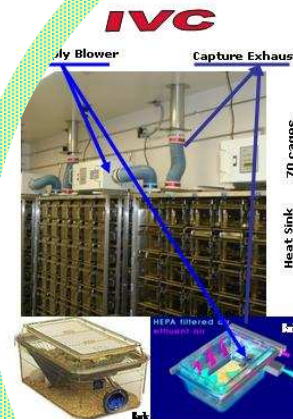


Space and Energy Efficiencies: Review of Two Case Studies

by Germain Rivard, DVM, PhD President of MouseCare, Ithaca, NY germain.rivard@mousecare.com



Space Requirements



HVAC Requirements
Annual Energy Cost
Annual Environmental Cost

Dr. Rivard is recipient of a State Energy grant that improves energy efficiency:

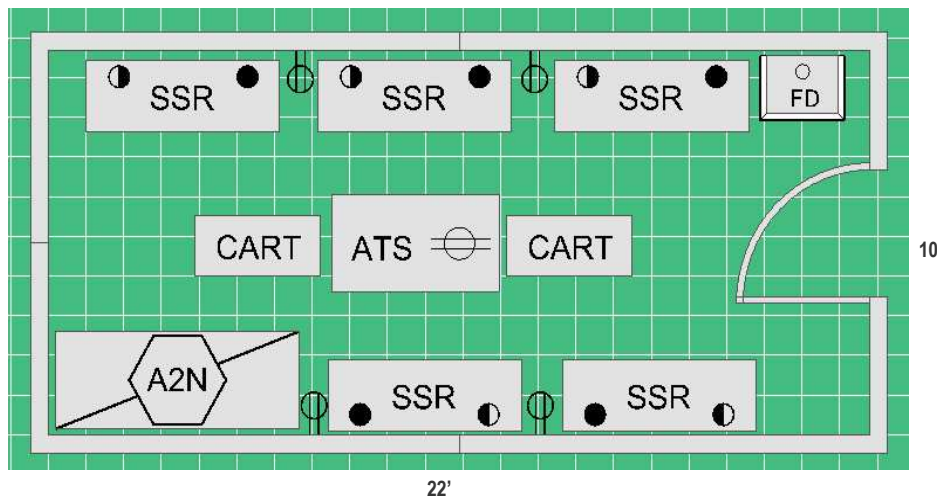
“Engineering Controls Improvements of Barrier Facility for Rodent Production”

Green Solutions to Productivity, Density, Flexibility, Safety, Valid Data Production

Case Study #1

Space Requirements

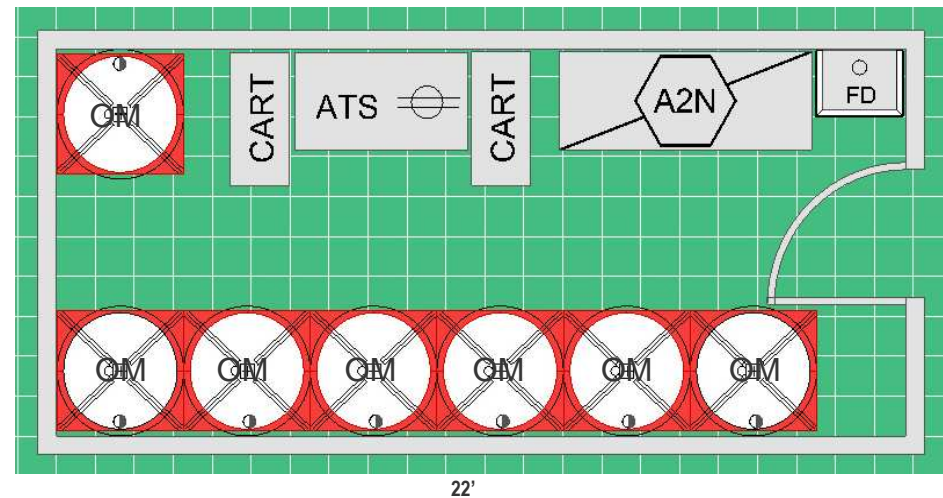
IVC Individually Ventilated Caging



$$350 \text{ SSR cages} \div 220 \text{ sf} = 1.6 \text{ cage/sf}$$

$$350 \text{ SSR cages @ 5 mice ea.} = 1,750 \text{ mice} \div 220 \text{ sf} = 8 \text{ mice/sf}$$

EVC Exhaust Ventilated Caging (HVAC-assist)



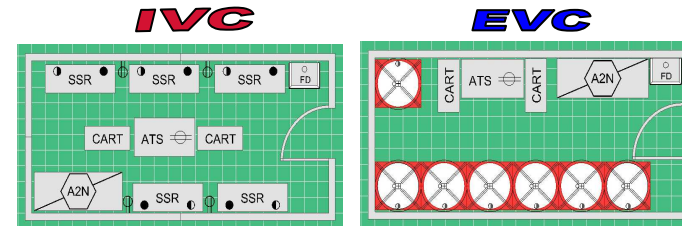
$$700 \text{ OM cages} \div 220 \text{ sf} = 3.2 \text{ cage/sf}$$

$$700 \text{ OM cages @ 5 mice ea.} = 3,500 \text{ mice} \div 220 \text{ sf} = 16 \text{ mice/sf}$$

SSR: Single-sided 70-cage rack
FD: Sink, **ATS:** Animal Transfer Station, **A2N:** Biosafety Cabinet
sf: Square Foot **ea.:** Each
OM (OptiMICE): Carousel 100-cage rack



Case Study #1



20 ACh

12 ACh

HVAC Requirements

Annual Energy Cost

Mice Population	1,750	3,500
Ventilation	\$ 400	\$ 212
Cooling/Heating	\$ 8,400	\$ 5,292
Plug Load	\$ 36	\$ 8
Energy (kW/y)	151,220 or 86 per mouse	85,352 or 24 per mouse
TOTAL	\$ 8,836 or \$5 per mouse	\$ 5,512 or \$1. ⁶⁰ per mouse

Annual Environmental Cost

CO ₂	115 tons or 130 lbs per mouse	65 tons or 36 lbs per mouse
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Notes: Inferences are from (1) Rivard, G.F., 2004. Designing Your New Animal Facility Part II: Integration of Engineering Controls in Animal Facility Design. FACILITIES DESIGN, Cont. Topics, 43; 5: 64-70; (2) Rivard, G.F. and W.S.(Lanny) Joyce, 2005. Energy-Efficient and High-Performance Rodent Facility. Labs21 Annual Conference, www.labs21century.gov/conf/; (3) State Energy Research and Development Authority, Energy Efficiency Study, July 2007, BioTech X, Liverpool, New York; and (4) EPA's document 'Laboratories for the 21st Century: An Introduction to Low-Energy Design'.

Plug Load: The electricity necessary to power electrical equipment.

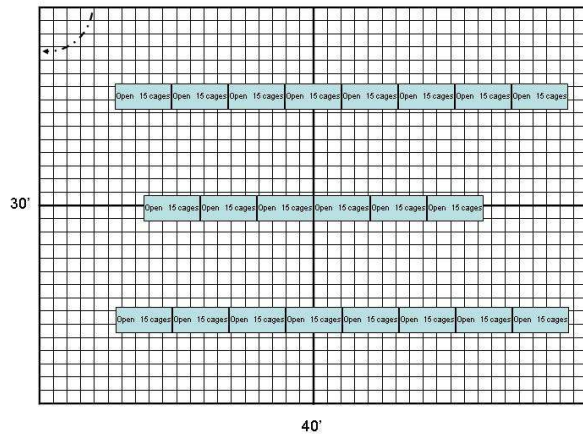


HVAC: Heating, Ventilation, Air Conditioning **ACh:** Air Changes per Hour
kW/y: Kilowatt per year **CO₂:** Carbon Dioxide **lbs:** Pounds

Case Study #2

Space Requirements

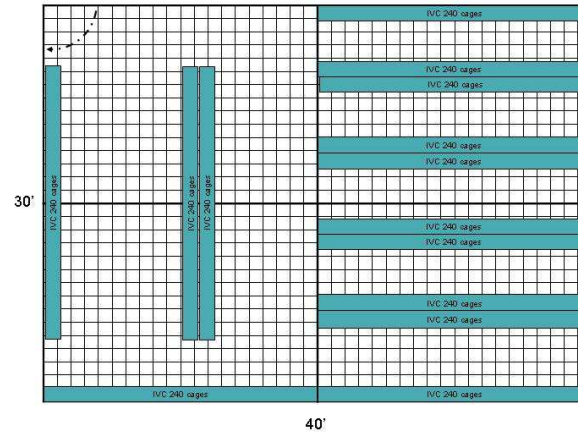
OPEN



330 cages [50 mice ea.] ÷ 1,200 sf = **0.3 cage/sf**

16,000 mice ÷ 1,200 sf = **13.3 mice/sf**

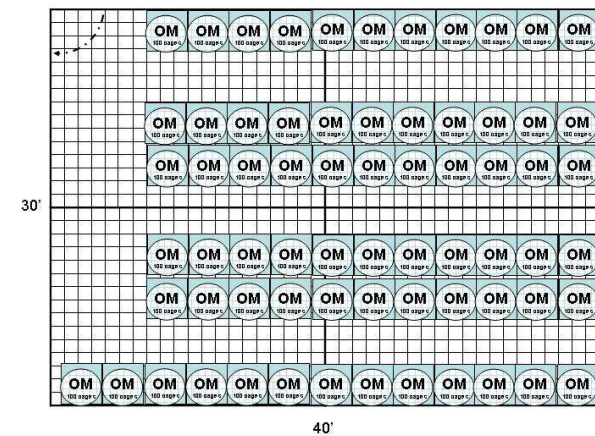
IVC



3,360 cages [5 mice ea.] ÷ 1,200 sf = **2.8 cage/sf**

16,800 mice ÷ 1,200 sf = **14 mice/sf**

EVC



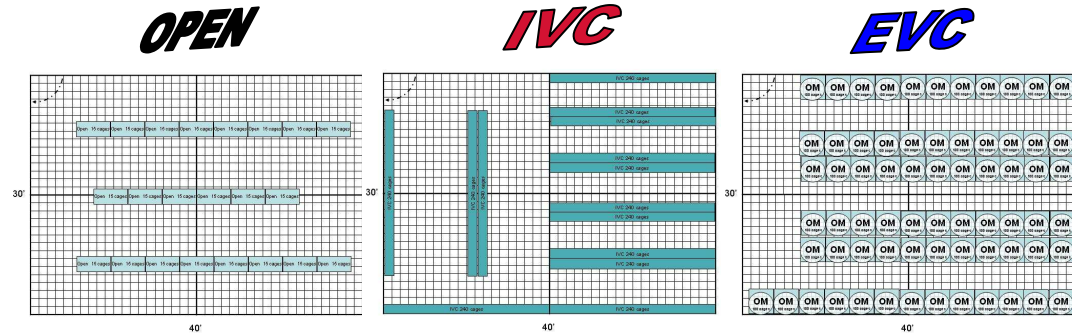
6,800 cages [5 mice ea.] ÷ 1,200 sf = **5.6 cage/sf**

34,000 mice ÷ 1,200 sf = **28.3 mice/sf**

Open: Double-sided 15-cage rack
ea.: Each **sf:** Square Foot
IVC 240 Cages: Single-sided 240-cage rack
OM (OptiMICE): Carousel 100-cage rack



Case Study #2



15 ACh

16 ACh

16 ACh

HVAC Requirements

Annual Energy Cost

Mice Population	16,000	16,800	34,000
Energy (kW/y)	320,000 or 20 per mouse	557,760 or 33 per mouse	557,600 or 16 per mouse
HVAC TOTAL	\$ 16,000 or \$ 1.00 per mouse	\$ 27,888 or \$ 1.66 per mouse	\$ 27,880 or \$ 0.82 per mouse

Environmental Cost

CO ₂	243 tons or 30 lbs per mouse	424 tons or 50 lbs per mouse	424 tons or 24 lbs per mouse
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Notes: Inferences are from (1) Rivard,G.F., 2004. Designing Your New Animal Facility Part II: Integration of Engineering Controls in Animal Facility Design. FACILITIES DESIGN, Cont. Topics, 43; 5: 64-70; (2) Rivard, G.F. and W.S.(Lanny) Joyce, 2005. Energy-Efficient and High-Performance Rodent Facility. Labs21 Annual Conference, www.labs21century.gov/conf/; (3) State Energy Research and Development Authority, Energy Efficiency Study, July 2007, BioTech X, Liverpool, New York; and (4) EPA’s document ‘Laboratories for the 21st Century: An Introduction to Low-Energy Design’.

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HVAC: Heating, Ventilation, Air Conditioning **ACh:** Air Changes per Hour
kW/y: Kilowatt per year **CO₂:** Carbon Dioxide **lbs:** Pounds



Help Save the Environment



Shrink the carbon footprint of your rodent facility

Institution: Reduce the environmental impact or Carbon Footprint by at least 50%

Facility: Reduce energy consumption by up to 68%

Animal Room: Directly exhausting 95% of heat loads = lower HVAC requirements

Cagerack System: HVAC-assist technology eliminates equipment plug and heat loads

Rack: DEV improves air mixing factor thus reducing the need for high dilution factor

DEV: Direct Exhaust Ventilation

Cage: Constant negative pressure airflow protect the animals and their users as well as promote convection and prevent radiation to reducing HVAC requirements

Make the planet a healthier place to live !



U.S. Fish and Wild Life Service, Steve Anstrup / AP



MouseCare offers Green Solutions to Productivity, Density, Flexibility, Safety, Valid Data