KEY DRIVERS WHEN DESIGNING ACADEMIC VETERINARY FACILITIES

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More than half of the country’s 30 accredited veterinary colleges have increased their class sizes in the past decade, some by up to 50 percent. Institutions are looking to expand their vet school class sizes to meet increasing demand and bring in tuition revenue. Class sizes at veterinary colleges have risen by an average of 1.8% a year for the last 30 years.

Current studies show that 36.5% of households own dogs, 30.4% own cats, 3.1% birds and 1.5% horses, averaging 1.6 dogs and 2.1 cats per household that has pets. In addition, there is a major shortage of veterinarians in rural areas with large animal livestock. Veterinary shortages persist in more than 150 rural communities encompassing approximately 1,100 rural counties across the country.

Realizing the need for more veterinarians and the trend upward in class sizes, many universities are considering adding or expanding their veterinary offerings. These new facilities need to respond to the changing landscape for the next generation of veterinarians — providing an identity and environment of exemplary quality. Through our experience designing academic veterinary environments, we have identified five key drivers to consider when planning these specialized facilities. We also feature two veterinary facilities throughout this paper as premier examples of how to practically apply the drivers.

The first is Texas A&M University’s College of Veterinary Medicine & Biomedical Sciences (TAMU CVM) — the only college of veterinary medicine in Texas, and only one of 28 in the United States. In association with SHW Group (now Stantec), CannonDesign provided laboratory planning for a new education building. Completed in the fall of 2016, the building was open for the CVM’s centennial celebration. The $120 million project ($98.6 million construction cost) replaces facilities built in the 1950s.

The second is North Dakota State University’s Veterinary Diagnostic Laboratory (NDSU VDL), which provides services for North Dakota veterinarians, livestock producers, and the public who rely on the facility for diagnostic test results, necropsy and other services. The AAVDL-accredited facility also includes advanced technology facilities, including a BSL-3 laboratory, which supports participation in the Veterinary Laboratory Response system, bioterrorism preparedness and animal/public health emergencies. In association with Zerr Berg Architects, CannonDesign provided early design and laboratory planning for the new $13.7 million, 28,000 sf building.
Five Key Drivers

Improved Environments: Safety Enhancements for Individuals and Animals

The primary driver of designing a new vet facility should be to create a safe and state-of-the-art facility for students, faculty and researchers, and a safe and humane facility for the animals.

Safe animal handling, especially the movement of large animals from exterior pastures into the building, is an important factor to consider. With carefully designed exterior cattle pens using a “bud box” design at TAMU CVM, we were able to direct cattle into the building through narrow overhead doors into cattle chutes for the students to study. The gates were padded for animal comfort and in some areas, a ladder was provided for people to quickly get out of the animal’s way if necessary.

Even the handling of animal carcasses can be improved by careful design. At both TAMU CVM and NDSU VDL, we utilized a monorail system complete with gantry and hoists that are able to move large animal carcasses from the outside of a building to controlled environmental rooms for storage and into the classrooms for study or onto the necropsy lab for diagnosis. These systems require careful planning of the route to achieve maximum flexibility and coverage within the facility and to the exterior of the facility.

To ensure cleanliness, it is essential to include innovative plumbing solutions in all live animal labs, anatomy labs and necropsy labs. For example, both facilities incorporated wash-down hose reels and trench drains integrated with flushing drains and wash-down nozzles to clean away animal waste. At NDSU VDL, a person exiting the necropsy lab steps into a disinfecting pit to sanitize their footwear before walking onto a grated boot area in the anteroom.

Additionally, soft floor finishes resistant to animal refuse should be used where animals walk to prevent injury. One should select materials such as cleanable epoxy flooring and wall finishes in wet areas like live animal labs, anatomy labs and necropsy labs. Safety and security from outside individuals that can construe these facilities as inflicting harm to animals (which is a misnomer) is a concern, and the design should consider this carefully. High windows or skylights that provide natural light but do not afford a view into the animal areas is another critical safety requisite.
Improved Flexibility and Collaboration in Lab Environments

Better flexibility ensures better ability to teach and learn in veterinary environments. Moveable student and instructor tables with built-in power ensures maximum flexibility in teaching style and lab use.

For the lab environments, microscopes often take up a large amount of space on work surfaces and therefore cannot be used for any other purpose. At TAMU CVM, we custom-designed a microscope table with sliding surfaces to house the microscopes that can be moved out of the way to allow students to have an uninterrupted benchtop for lab work. A nice feature to incorporate if the budget allows is a shallow raised floor system in dry labs that allows for floor-mounted power and data. Additional features that can support flexibility and collaboration include:

- Base cabinets can be rolling cabinets to foster flexibility and cleanability of floors.
- Moveable wall system for cubicles can provide visual and acoustical privacy while students work with animals.
- Custom removable and portable indoor cattle chutes can increase flexibility in labs from semester to semester.
- Spaces like lab theaters, atriums, food courts, and lounges can promote interdisciplinary research, learning, and interaction among students and faculty.
In order to attain a state-of-the-art veterinary facility, special design requirements like major structural, MEP and storage solutions need to be employed.

Structurally, the use of wide and high bays allows for teaching labs to be open and unencumbered by columns and able to accommodate large animals. This also helps support the monorail system discussed previously to be installed with enough height for the large animal carcasses to hang from and not impede the movement of people. At TAMU CVM, a structural solution to accommodate trench drains and floor slopes involved installing an 11” deep topping slab over the structural slab.

There are a wide variety of MEP solutions to ensure a facility has a smart infrastructure that enhances efficiency and safety. These comprise of smart plumbing designs that include trench drains with flushing drains and wash-down nozzles, ceiling-mounted utilities in surgery suites, and live animal labs that allow for a more open work environment while keeping the floors clear of utilities. In addition, the ability to design MEP systems for varying temperatures and ventilation needs is integral to a space. MEP systems need to be designed for very hot and humid conditions in certain rooms, that house equipment like the degreaser and the steam kettles. Depending on the nature of the labs, there may be a need to alleviate odors of hazardous chemicals like formalin and formaldehyde gasses. A few of the solutions include:

- Low-level exhaust to alleviate odors from hazardous gases like formalin that are heavier than air
- Higher air changes per hour in certain rooms where animal carcasses are stored and in labs were students work on both live and deceased animals
- Use of ventilated tables to protect from hazardous vapors

Storage should be taken into careful consideration and is a key infrastructure component. In addition to several dry storage rooms, which include storage for animal feed, bones, and chemical storage, these facilities also require several temperature controlled rooms:

- Incubators for storage of samples for microbiology lab
- Cold rooms for storage of large and small animal carcasses and smaller animal parts
- Freezer rooms for small animal carcasses.
- Pass-thru refrigerators

Biosecure and Biosafety level 3 (BSL-3) spaces, such as the one found at NSDU VDL, may be required in some facilities where veterinary diagnostics are performed. Such facilities will require special decontamination tanks for waste disposal.

Carcass disposal systems like incinerators or digesters may be required in some facilities. Careful planning of the location of the incinerator along with infrastructure (ventilation, structure and monorail access) to support it needs to be considered.
With the advancement of technology in everything we do and current trends in teaching that seamlessly incorporate technology into learning, the ability to access state-of-the-art technology in learning environments is critical. Veterinary schools have needs beyond the typical lab or classroom. It is now typical to have several large-format display monitors in all of the teaching labs placed around the perimeter of the rooms with AV connected to:

- Instructor and student microscopes to project images on the display monitors and laptops
- Instructor and student laptops to acquire images from the microscopes and to project content on the display monitors
- Cameras in surgical lights above surgery tables to review and record surgeries
- Cameras above the horse stocks and cattle chutes to review and record procedures
- Digital anatomy tables

This arrangement, incorporated in all of the teaching labs at TAMU CVM, promotes agility and flexibility in teaching methodologies where the instructor can walk around the room and be more accessible to the students rather than the traditional way of teaching where the instructor is tied down at one end of the room. This arrangement also fosters “distance learning,” which is the education of students who may not always be physically present. This is fast becoming a trend in many universities.

Simulation labs are another fast-growing trend in CVMs, which provide an ideal way to train students. It is a safe environment where students can practice and gain experience and confidence without causing harm to the animals. In recent years, the use of plastinated (preservation technique applied to specimens) organs as a teaching resource in anatomy teaching labs has become prevalent. The inclusion of a plastination lab to produce plastinated specimens is a convenient addition and was included at TAMU CVM.
Sustainability and Cost Savings

Energy saving features can be incorporated such as variable volume laboratory control systems, demand control ventilation in high occupancy areas and ductless fume hoods.

Program efficiencies can be achieved by providing one teaching lab for multiple divisions. At TAMU CVM, this was implemented after performing an analysis of classroom and laboratory schedule and student course enrollment, including number of regularly scheduled meetings, training and exams. As a result, it was determined that four divisions (embryology, neurology, histology and clinical pathology) could share one lab effectively without loss of time or space.

Sharing of clinical facilities like teaching hospitals with other private organizations or other educational institutions can also eliminate the need to build additional space.
Conclusion

Animal health is becoming increasingly intertwined with human health and well-being on a personal, environmental and global level. To meet the growing demand for qualified veterinarians, it is essential for universities to expand and adapt to the ever-changing advances in animal medicine. If careful planning and design of these facilities are considered, future generations of veterinarians will be set up for success to thrive in the profession.

About the Author

Deepa Balgi, Assoc. AIA, has extensive experience in laboratory planning and design of a variety of academic, corporate, and research facilities. As a laboratory architect and technical coordinator, Deepa focuses on addressing particular challenges that arise during complex design and construction processes. From architectural design through construction administration, Deepa has strengthened her ability to design, detail, and coordinate all phases to exceed her clients’ expectations and achieve financial success.

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