

21.4. Clinical Resources

21.4.1. Complete Tables A, B, and C for the past five years and analyze trends for each species (category).

See Appendix 4-1 for Tables A, B, and C. Canine, feline, and equine case accessions in the Teaching Hospital have steadily increased (13.6%, 13.9% and 22.2% increase, respectively) from 2001 to 2006. Number of hospitalized days has increased proportionately for these species. In-house food animal case accessions have decreased modestly over the same time period (-26.6%) owing largely to the decreasing demand for individual food animal medical services, and increasing urbanization of the Triangle region surrounding NC State. Small ruminant case hospital accessions have increased 13.6%-57.5% (depending on species) over the past five years, reflecting a continued but modest demand for individual animal medical services in these species. The low number of pet bird accessions since 2004 are the result of closure of our in-house pet avian/reptile/exotics service in 2004. Students are instructed in these species off-site (see section 21.4.3). Ambulatory/field service bovine accessions decreased in 2002-2003, and over the five year reporting period as a result of closure of one of the area's State Dairies. The dramatic increase in porcine and "Other" (poultry) field service cases accessions/animals examined in 2005-2006 reflect more accurate record keeping on the part of our swine and poultry faculty in documenting their field trips. In other words, we feel the case accession data for 2005-2006 accurately reflects the number of "at-risk" animals involved in poultry and swine operations field service visits. These data reflect "at-risk" animals (i.e., number of animals in the specific production facility (e.g., poultry house) at the time of the visit, rather than the number of individual animals examined. We cannot retrospectively confirm the number of animals "at risk" for prior years.

21.4.2. Describe and analyze the adequacy of normal and clinically diseased animals (hospitalized, out-patient, field service/ambulatory and herd health) used for the DVM teaching program.

Within the VTH, students are exposed to a large and growing number of diseased dogs, cats and horses through our specialty (referral-oriented) services including companion animal internal medicine, soft tissue and orthopedic surgery, dentistry, dermatology, ophthalmology, cardiology, neurology and equine internal medicine, soft tissue and orthopedic surgery. As the companion animal hospital operates on a referral basis, these cases are considerably more complex than those encountered in routine general practice. The College has broadened the student exposure to normal and "primary care" companion animal cases through our shelter medicine/community practice programs, companion animal wellness clinics (see section 21.4.3), and structured externship programs. While the equine hospital also operates on a referral basis, the complexity and drift away from "primary care" type cases has not been as profound as with companion animals. Equine ambulatory/field service calls to a state prison and structured externship experiences are used to provide additional primary care instruction. The closure of the in-house pet avian/reptile service in 2004 has been mitigated by developing off-site instructional opportunities (see section 21.4.3). While in-house food animal accessions have remained relatively modest, considerable instructional opportunities exist on off-campus sites through our field service/ambulatory programs and externship opportunities.

21.4.3. Describe unique clinical educational resources or programs that enhance the educational mission.

Community-Campus Partnership (CCP) Program: Created in 2000, the CCP Program serves the needs of our veterinary students and the Wake County Animal Care, Control and Adoption Center, which shelters more than 10,000 animals annually. The bipartite mission of CCP program is to equip the next generation of veterinarians with community-oriented competencies necessary to practice in a changing veterinary environment and to make a difference in the lives of their clients and the diverse communities they serve. To achieve this goal, this clinical training program aims to increase primary care opportunities for students to practice routine surgical procedures and to diagnose and treat common diseases of dogs and cats in the Wake County Animal Care, Control and Adoption Center. Two full time faculty supervise fourth-year veterinary students (70 students each semester) on two-week clinical rotations at the Center as part of VMC 970 – Community Classroom Experience in Companion Animal Practice. Additional clinical opportunities associated with the CCP Program include serving shelters in rural North Carolina counties with the Mobile Surgery Hospital and providing preventative care for service dogs in the NC Department of Corrections.

Zoological Medicine Program – Clinical Aspects: Zoological medicine disciplines at NC State include exotic animal private practice, aquatic animal medicine, wildlife medicine, and zoo practice. These combine many elements of veterinary medicine, including preventative medicine, population medicine, clinical medicine and surgery, pathology, ecosystem health, regulatory compliance, facilities and personnel management, and research. Six CVM faculty, three zoological medicine residents, and more than 10 active adjunct faculty provide a variety

of elective clinical experiences for interested students. Clinical training in zoological park and wildlife medicine is offered via four-week rotations (VMC 989) at the North Carolina Zoo. Experience in exotic animal clinical medicine is offered in a senior year clinical course (VMC 988) that combines work with CVM faculty and rotations in private exotic animal practices. Colonies of companion birds and reptiles are maintained in Laboratory Animal Resources facilities to assist student training. Students can complete rotations focused on wildlife rehabilitation at the NC Zoo (VMC 998) and Piedmont Wildlife Center (VMC 996); the CVM Turtle Team provides ongoing experiences in rehabilitation of turtles (credit available in VMC 928). Rotations in aquatic animal medicine (VMC 987) and sea turtle health management (VMC 950) are also available. In addition to CVM based courses, extramural experiences at other zoological facilities, wildlife field studies and private practices are encouraged (VMC 921 & 963). Experiences in international zoological medicine are available through the Veterinary International Field studies course (VMC 999).

Clinical Zoological Medicine is currently supported in the VTH through the field services unit and underclass and senior students are often included in these endeavors. A clinical contract with the NC Museum of Natural Sciences allows for 24 annual field service visits (and periodic VTH admissions). The field service unit also supports clinical efforts at the three NC Aquariums, Karen Beasley Sea Turtle Hospital, Center for Marine Sciences and Technology, NC Wildlife Resources Commission, Bass Pro Shops Inc., Rocky Mount Children's Museum, and other large-scale clients across the state. Although a comprehensive exotic animal practice does not currently exist in the VTH, a full service practice is planned following completion of our new specialty veterinary hospital.

Veterinary Behavior Program: Veterinary behavior is a growing specialty at the CVM. Prior to 2005, NCSU was one of the few veterinary colleges in the United States that required of all veterinary students a course in animal behavior (VMC 927), "Introduction to Companion Animal Behavior," taught by a board-certified veterinary behaviorist. In 2005, a veterinary behavior specialist joined the CVM faculty as part of the Animal Welfare, Ethics and Public Policy Program. In addition, a new selective course, "Animal Behavior and Welfare," was added to the curriculum. Currently, a three-year program to develop clinical behavior services is underway. In 2006, the CVM approved a residency-training program in veterinary behavior that will lead to board certification by the American College of Veterinary Behaviorists. Later this year, a behavior consultation service for VTH inpatients (companion animals and horses) will be implemented as part of the residency-training program. Limited behavior services for companion animal outpatients will begin in 2007.

Companion Animal Wellness Clinic: Initiated in 2004, this clinic is held biweekly on Saturdays in the Teaching Hospital. The service (vaccination and other routine health care) is offered to students, staff, and faculty at the College, and is staffed by a veterinary technician, third year professional students, and a senior house officer (generally internal medicine). Appointments are offered every 30 minutes, with ample time for students to perform and practice history taking, physical examinations, and planning of vaccination protocols. Though these are well animals, they frequently present with other "primary care" problems, and provide an excellent instructional experience to the student under a low-pressure system. The VTH plans to expand this service.

Field Service/Ambulatory and Herd Health: Like many Colleges of Veterinary Medicine in urban areas, the caseload in the Veterinary Teaching Hospital for food animals is modest, and has decreased over the past five years. The primary focus of food animal instruction in the 4th year of the DVM teaching program is for students participating in elective rotations through the Field Services section of the VTH under the direction of faculty in the PHP Department. A variety of clients are engaged, including university College of Agriculture/University Field Labs, state Department of Agriculture and Consumer Services, commercial swine and poultry operations, and privately owned and operated farms. DVM students have exposure to large and small ruminants through a 4th year rotation which combines in-hospital services for clients and referring veterinarians with field services calls, many of which are programmed herd work. Bovine, caprine or ovine farms calls have varied between 226 and 368 over the past five years, with 8,000-15,000 animals examined.

With few exceptions, the swine and poultry operations are corporately owned, most with their own in-house professional veterinary consultants. Through cooperation and collaboration with these veterinarians, numerous opportunities are available for our students under the supervision of our faculty. Increasingly, these calls are requested by company veterinary staff members who rely on the expertise of the College's faculty. Improved recording efforts on the number of animals examined documents that our faculty and students made over 260 ambulatory calls in these areas involving over 280,000 "at-risk" animals.

Teaching Animal Unit (TAU): The TAU is a teaching facility located on the CVM campus, which houses a wide variety of food and farm animals. It is operated as an onsite production farm. Veterinary students gain valuable experience in the day-to-day management and preventative health care of beef and dairy cattle, swine, horses, turkeys, broiler chickens, goats and sheep. The TAU animals provide the foundation for teaching six required semester courses (Health Maintenance and Animal Production I, II, and III) taught to students in each semester of their first three years of the professional curriculum. Through live-animal laboratories, the TAU provides an opportunity for students to develop confidence in handling and managing various farm animal species and to develop an understanding and clinical competency in production management, preventative health care, diagnostic techniques, food safety, housing, biosecurity and animal welfare. One hundred and fifty-five live-animal laboratories are taught annually at TAU. Each class of approximately 76 students participates in laboratories in each of the animal species every semester. A faculty director oversees the management and health care of the entire unit with the support of a unit manager and four technicians. The TAU animals are also used to support the teaching in selective courses, graduate courses (4) and in fourth year food animal and equine clinical rotations. Four clinical residents in poultry and ruminant medicine have weekly interaction with TAU animals. The entire operation of the TAU is based on providing the opportunity for students to learn and understand the farm animal management and preventive health care, while acquiring must learn skills in each of the TAU species prior to progressing to their clinical year.

The TAU is located adjacent to the main CVM building on 80 acres subdivided into 26 lots and smaller pastures. TAU maintains two confinement operations for swine and poultry. The swine farrow to finish operation has three confinement buildings that utilize 4,566 sq ft of space. The poultry confinement building utilizes 5,600 sq ft. A sheep and goat barn utilizes 4,725 sq ft. There are two large barns, one for horses and one for dairy cattle. Both the dairy cow and horse barn have 5,292 sq ft. The horse barn contains 12 stalls. The dairy cattle are fed in ½ of the dairy barn. A beef shed where beef labs are performed utilizes 3,500 sq ft. The horses, beef cattle, dairy cattle, goats and sheep also use approximately 70 acres of pasture. There are 11,876 sq ft of supplemental open sided pasture shelters and feeding stations. TAU maintains an off site non-milking dairy herd that are pastured on 28 acres.

TAU maintains and operates a USDA Grade A Dairy, inspected by the NC Department of Agriculture. There are, on average, 18-20 milk cows, 3-5 dry cows, and 4-6 replacement heifers maintained yearly. The dairy cows produce 18-20 calves per year. There is a swine farrow to finish confinement operation that houses 34 sows, 10 replacement gilts and 3 boars. The swine unit maintains approximately 125 nursery and feeder pigs at any one time for student instruction. The 22-cow beef herd produces 15-18 calves annually. The cross-bred sheep flock of 22 ewes produces 35-40 lambs annually. Likewise, a breeding goat herd of 20 meat type goats is maintained producing 23-28 kids annually. Finally, of the 28 quarter horses, 4-5 are bred to produce foals. An offsite (one mile from CVM) non-milking dairy herd of 22-25 cows is maintained and used to supplement certain student laboratories.

Equine Health Center at Southern Pines (EHC-SP): This off-campus satellite clinical operation is located on 87 acres approximately one hour from the CVM. Active clinical services located at this facility include an equine theriogenology program offering embryo transfer, artificial insemination, and other advanced breeding techniques (very active during the horse breeding season); a Contagious Equine Metritis (CEM) quarantine program, an outpatient equine podiatry clinic (1 day/week), and an outpatient companion animal and equine ophthalmology clinic (2 days/month). The Center also offers diagnostic laboratory services to regional veterinarians. Professional students and house officers are integrally involved in these services through senior year rotations or assigned duties. The center has a facilities manager, three full time and one part time staff members, and a faculty director who provides oversight. The CVM plans to increase the clinical service activities at the EHC-SP over the next five years, including additional pasture and paddock space, and construction of a 12-stall barn with clinical facilities.

21.4.4. If off-campus clinical instruction is used, complete Table D and describe the planning, supervision, and monitoring of students; and contracting arrangements for non-institutional based faculty.

Not applicable.

21.4.5. Describe the involvement and responsibilities of professional students in the healthcare management of patients (and clients) in clinical programs of the college.

The involvement and responsibility of students in the healthcare management of patients and clients in the clinical programs of the College vary somewhat among the specific services and type and complexity of the case. For companion animal, equine, and food animal non-emergency referral cases, students typically are responsible for history taking and physical examination, developing a differential diagnosis list, diagnostic and therapeutic plan, and discussing this list/plan with a house officer or faculty member. Students are present when informed consent and financial discussions are conducted by the attending clinician. For hospitalized cases, students assume primary responsibility for care and evaluation of hospitalized cases. They are responsible for some of the nursing care, and order and submit appropriate diagnostic tests. Under the supervision of staff and clinicians, students perform routine technical skills such as venipuncture, cystocentesis, catheter placement, fine needle aspirates and biopsy collection, bone marrow aspirates, etc. Students assist or observe in more complex, invasive, or advanced procedures such as many surgical procedures, endoscopy, cisterna magna taps, joint injections, sophisticated imaging studies, etc. The extent to which students actively perform other, more complex diagnostic, surgical, or therapeutic task varies according to the case complexity and perceived competency of the student, and is largely at the discretion of the attending clinician.

Students are responsible for daily (or more frequently if appropriate) physical examinations and monitoring of the patient, and daily progress notes and other medical record notations using the “SOAP” methodology. Students are actively involved in client communication, and for some services, communicate with the referring veterinarian. Students routinely compose a client/referring veterinarian discharge summary, and generally have the responsibility to discharge the patient and discuss instructions and the follow-up care and plans with the client. In service rounds, students are expected to actively participate in the decision-making process and formulation of diagnostic and treatment plans. All aspects of student involvement in case management processes are closely supervised by staff, house officers, and clinical faculty. A similar approach is taken with students involved in ambulatory/field service food animal services, although the extent to which students participate in “hands-on” activity is greater. Students participating in the Community Practice/Shelter Medicine and Companion Animal Wellness Clinics have considerable more opportunity and responsibility in “hands-on” activity and perform a greater number of technical, diagnostic, and surgical tasks. The responsibilities of students participating in services without primary patient care responsibilities (Clinical Pathology, Necropsy, Microbiology, Anesthesia, Radiology) vary according to the service, but all have direct faculty oversight. For example, students perform complete necropsies under the supervision of a pathology faculty member or resident. In anesthesia, students are responsible for formulating an appropriate anesthetic and monitoring regime, placing cephalic catheter and endotracheal tube, and monitoring of the patient until extubation. Radiology students are responsible for learning the technical aspects of imaging techniques, and interpreting normal and abnormal imaging studies under the supervision of faculty and residents.

21.4.6. Describe how subject-matter experts and clinical resources are integrated into clinical instruction.

Subject matter experts including clinical faculty (the large majority of which are board-certified in their discipline) house officers (particularly second and third year), and professional nursing staff members, are integrated into the clinical instruction by direct supervision and oversight of the students engaged in the process described in 21.4.5. Most services conduct daily rounds and case discussions that include faculty, house officers and students. Some services conduct both morning (topic-oriented) and evening (case-oriented) rounds discussions. Two experienced emergency veterinarians with extensive experience in private emergency clinics staff our companion animal after-hours emergency service. Content specialists from private practice are routinely used in selective course offerings, pet avian rotations and selectives, zoologic medicine rotations, and approved externships.

A wide variety of resources (case material) is available for clinical instruction from animals and clients of the teaching hospital, ambulatory services, animals in the Teaching Animal Unit, Wake County Shelter and Equine Health Center at Southern Pines, and cases seen on externship. Case material is frequently and actively incorporated into didactic lecture and laboratory presentations in the pre-clinical years.

21.4.7. Describe the adequacy of the medical records system used for the hospital(s).

21.4.7.a. Medical records, including field service and/or ambulatory and population medicine activities must be comprehensive and maintained in an effective retrieval system to efficiently support the teaching, research, and service programs of the college.

The VTH utilizes a unit record concept (one number per patient) and the POMR (Problem Oriented Medical Record) format for documenting clinical information concerning inpatients, outpatients, and field service activity. The unit record approach centralizes the complete ‘hard copy’ historical and clinical summary information and promotes both efficiency in access and information utilization. Field Service/Herd Health

records follow the same concept; the only exception being that the entire herd has one (1) unique medical record number. All information pertaining to an 'aggregate herd/flock/school' designation is filed within the herd record. Individual trip call record sheets identify problems with a specific animal.

The Teaching Hospital Information System (THIS) billing application for medical record information i.e., billing/client/patient demographics was utilized from 1985-2003 utilizing Cognos' PowerHouse. UVIS (Universal Veterinary Information Systems) was implemented in July 2003 and consists of an Oracle database and Oracle forms front-end. Patient/client demographic information is contained within UVIS-Universal Veterinary Information System. All ancillary lab report data and is captured within the 'core' elements of UVIS. We have been involved with UVIS, the Ross group and the other schools using UVIS since the middle of 2001. We are currently discussing moving up to a web capable version of UVIS, tentatively scheduled for release late in 2007. The clinical faculty and our Information Technology department will evaluate a new electronic medical record module of UVIS in 2007, and we anticipate the need for a new electronic medical record system of some type by late 2009, the projected date of completion of the Terry Center.

The data stored in the UVIS and old hospital system is available to the CVM community via browser-based applications. These applications are used on a regular basis by students and faculty for studies. When the search is too complicated for the search tool, the Hospital Information System liaison or a member of Computing Resources assists. The medical record group also does occasional record searches, about 50 per year. There are also daily requests for data on a walk-in basis in the medical records area. Additionally, medical record data is captured via SNOMED (Systematized Nomenclature of Medicine and Veterinary Terms) and the implementation and application of the Veterinary Medicine Database (VMDB) Program's external abstract and web-based search tool VVDEA (VMDB's Veterinary Data Entry Application). The VMDB is the veterinary schools' data consortium/clearinghouse, residing at University of Illinois. The end-user may also utilize this database to conduct a more refined internal or external data search. With the aforementioned combinations of data search capability, the end-user has a sophisticated array of tools to conduct concurrent and retrospective studies.

21.4.8. Describe how the college has responded to increasing/decreasing clinical resources.

The referral caseload (and therefore instruction material available for our students) has shown steady growth in our companion animal specialty services, and equine services. The College has responded to the need for companion animal "primary-care" cases through implementation of a wellness clinic, community practice/shelter medicine program, and increased number of externship opportunities in area private practices. The College has responded to the increased number of referral companion animal and equine cases by dramatically increasing hospital-based technical staff, increasing house officers (from 38 in year 2000 to 61 in 2007), and clinical faculty. This has largely been accomplished through hospital based revenue generation rather than state-appropriated resources. The most deficient resource in the VTH, particularly in the companion animal hospital, is space. The College has responded to this need through planning for a new hospital and renovation of the current one. We have responded to closure of the avian/reptile service through off-campus instruction opportunities described in 21.4.3. Decreasing or static in-house food animal case accessions, and closure of a local state-owned dairy herd used in our teaching programs have been mitigated by developing additional ambulatory/field service opportunities and developing relationships with state food animal practitioners and farms with case material. (see section 21.4.3). Section 21.3.5 describes other plans for campus improvement, largely based on an anticipated continued growth of the companion animal and equine caseload.

21.4.9. Describe the means used to maximize the teaching value of each case across the curriculum.

Virtually all cases in the teaching hospital and satellite clinical operations are used as teaching material for fourth year students. Efforts are made to maximize the teaching value of each case by requiring student involvement/participation (described in 21.4.5), routinely conducting case-based rounds discussions on these cases (allowing other students and house officers to benefit), and archiving case material in our medical records systems (PACS, UVIS) for rapid retrieval and broader dissemination. Clinical faculty and house officers encourage students to examine cases on other clinical services with interesting clinical abnormalities. Where appropriate, clients with animals that die or are euthanized in the VTH are counseled as to the benefit of a complete post-mortem examination, which gives other students opportunity to perform and interpret necropsies. Faculty use actual case-based material (and images) in Years I-III core curriculum and selectives, and several selectives are intentionally designed to introduce clinical material to students in the pre-clinical years. Pre-clinical year students also have the opportunity to take elective, selective, and summer programs that utilize hospitalized cases in the VTH.