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## Poultry: Cooperative Diagnostic Laboratory

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Dr. Eckroade explained that a variety of conventional tests used to detect the amount of antibodies in the blood can be performed on ELISA not only in less time, but with considerably less expense.

While Dr. Eckroade hopes to implement ELISA over the next year, he noted that there are still some chicken antigen cross reactions occurring that have yet to be worked out. All the other mechanics are in order.

The ELISA technology, secured through competitive grants, is a cooperative project with Penn State's Dr. Richard Wilson.

Affiliated with the University of Pennsylvania since 1976, Dr. Eckroade has increased his staff from one technician to three, a caretaker and a secretary, all of whom recently moved into the new, larger headquarters on Byrd Road.

Working closely with Dr. Eckroade in the laboratory and on field problems is Dr. Linda Silverman, one of the first female poultry diagnosticians in the country. Other staffers include: Nancy Fitzkee, head technician, Pam Tully, technician, Betsy Frey, research associate, Ruth Hollodick, secretary, and David Hoffman, animal caretaker.

Originally from Virginia, Dr. Eckroade did his undergraduate work at Virginia Polytechnic Institute. He earned a master's degree and a Ph.D. degree from the University of Wisconsin and received his D.V.M. from the University of Georgia. Expressing an early interest in a small animal practice, he later had a mixed practice in North Carolina. Then he took a position in a poultry laboratory, and in his own words, "loved it."

Penn's poultry expert, Dr. Eckroade received the Lindback Award for teaching poultry diseases and was recently appointed adjunct associate professor of veterinary science at Pennsylvania State University.

But there's a lot more to the amiable, long-sideburned Bob Eckroade than "just us chickens," as the expression goes. A licensed pilot with an apparent sense of adventure, he enthusiastically described the white water rafting trip down the Colorado River he and colleagues from the New Bolton Center recently took.

On an isolated fifty-two-acre farm in Rising Sun, Maryland, he and his wife, Carlene, a research chemist for W. F. Gore and Associates, raise a few horses, chickens, and some cattle. Two sons, Bob, Jr., and Bill, and a daughter, Sherri, complete the Eckroade family.

Back on the subject of chickens, he joked, "I've often been accused of having an unnatural attraction to chickens." On a more serious note, he added, "When producers' profit margin goes down because hens stop laying eggs, you're the person they turn to for help. We can't do it all, but if we can learn to solve one person's problem, that will also help others."

## Endangered Cats

At most zoos cats are the star attraction and the Philadelphia Zoo is no exception. Their family of Siberian tigers draws a crowd regularly.

Throughout the world there are seven subspecies of tigers. Of the seven the Caspian and the Bali are gone. Five remain: the Bengal, the Chinese, the Javan, the Siberian, and the Sumatran. The Bengal, with four to five thousand in the wild, is the most numerous species. Only 200 Siberian tigers live in their natural habitat. Zoos possess close to one thousand.

*Panthera tigris altaica* (Siberian tiger) is found in the Amur River region near the Soviet Far East and Northern China. The area consists of mixed deciduous forests and open, rocky, mountainous terrain. Siberians are solitary hunters that depend greatly on their hearing. Often they detect their prey at a distance of over 500 meters. Wild boar and red deer are their preferred meal.

The largest of the felines, Siberians usually measure six and a half feet in length and have a three-foot tail. Their average weight is 350 pounds. The record weight for a Siberian is 645 pounds. During winter they develop a layer of fat as insulation that enables them to tolerate low temperatures.

The Siberian family at the Philadelphia Zoo has an interesting history. Kundar, the male, arrived as a cub from the Leipzig Zoo, where captive breeding has been extremely successful. He weighs over 600 pounds and is about thirteen years old. Tigers live about twelve to thirteen years in the wild. In captivity their life spans nearly double.

Kundar is no stranger to the University. A couple of years ago students from the School of Dental Medicine performed root canal surgery on Kundar and capped a few of his teeth as well!

Zeya, Kundar's mate, arrived from the Milwaukee County Zoological Gardens. On July 4, 1980, she gave birth to three female cubs. They were named Martha, Abigail, and Dolly in honor of the first three presidents' wives. The girls live in separate cages near their parents. The Zoo also owns two Siberians currently at the Utica Zoo in New York.

Because of their grand size, beautiful color, and striping, Siberians are very popular in zoos. Their popularity has caused zoos to overbreed the species. Today there are more captive tigers than there are spaces available. Many zoos have stopped breeding and use a tiger version of birth control pills to prevent pregnancy.

Yet since captive tigers often live twice their normal life span, breeding may not occur until later than usual and a whole generation may be lost. The result is an unusual age distribution of cats. Also, most of the captive Siberians are descended from a relatively small gene pool resulting in a lack of genetic diversity in the animals.

The Species Survival Plan (SSP) is a controversial North American plan that provides strict guidelines for genetic purity in captive animals. This past September the International Union of Directors of Zoological Gardens met in Rotterdam. The Union asked Dr. Ulysses Seal, chairman of the Captive Breeding Specialists Group, to expand the North American plan for international use.

If the SSP is adopted internationally, the structure of zoos will change dramatically. No longer will individual zookeepers make decisions concerning the breeding of animals. They will have to consult international guidelines.

The Philadelphia Zoo would be concerned mainly with the Operation Siberian Tiger phase of the SSP. Controversy over this plan seems imminent. To create the space needed for a large genetic diversity in captive tigers that corresponds to the genetic diversity found in wild tigers, many existing Siberians would have to be euthanatized. In fact, some tigers today are so inbred that they too would not be kept.

Public reaction to the euthanatization of animals is expected to be highly critical. Recently the Detroit Zoo tried to euthanatize one of their old Siberians whose medical history was extremely poor. There was a tremendous public uproar.

If the Philadelphia Zoo subscribes to Operation Siberian Tiger, Bill Donaldson, a zoo spokesman, believes a public education campaign of the SSP will be imperative. Zoos must aid the preservation of animals and their genetic purity. According to Donaldson, the public needs to understand that without the SSP the captive Siberians of the future will be substantially different from their ancestors in the wild.



### Diagnostic Laboratory

One sick chicken poses a serious threat to an entire flock. When you're in the business of raising chickens or other fowl for profit, poultry disease can spell economic disaster. That's why many poultry farmers and cooperatives bring their ailing birds to Dr. Robert J. Eckroade, New Bolton Center's poultry expert.

Dr. Eckroade, associate professor of poultry pathology, heads the Poultry Pathology Laboratory on Byrd Road across from the sprawling rural campus of the University of Pennsylvania's large animal hospital. It is one of four regional diagnostic laboratories in the state, two other Pennsylvania Department of Agriculture affiliated laboratories are located in Doylestown and at Pennsylvania State University. There is also a state laboratory in Harrisburg.

"The laboratory serves three major functions," explained Dr. Eckroade, who also directs the business activities of the American Association of Avian Pathologists as secretary-treasurer of the organization, which makes its headquarters at the laboratory site.

"We provide a poultry diagnostic service to area poultry farmers, cooperatives and veterinarians. We also provide an educational service, teaching vet school students and sponsoring poultry education programs for the public. The smallest component of our work right now is research."

The poultry laboratory is partially funded through an annual grant from the Pennsylvania Department of Agriculture's Bureau of Animal Industry to support diagnostic services only. Competitive grants from the U.S. Department of Agriculture and the Pennsylvania Department of Agriculture help to fund poultry research programs.

Poultry is a major industry in Pennsylvania, which is the third- to fourth-largest table-egg producing state in the country. With an agricultural economy dependent on healthy animals, there is an acute need for veterinarians who specialize in poultry medicine and can provide expertise in poultry disease control.

According to Dr. Eckroade, most practicing veterinarians have had little poultry training or experience. While poultry medicine is broadly covered in the veterinary curriculum at many schools, it is rarely studied at any depth.

At the University of Pennsylvania, poultry medicine is a required course for sophomores, and additional elective courses are offered in advanced study and in senior rotation programs at New Bolton Center. Dr. Eckroade designed a two-year residency program specializing in poultry diseases and how to prevent them.

"Veterinary medicine had essentially deserted the poultry industry," said Dr. Eckroade. "The huge cooperatives have a critical need for this specialty and fewer than a hundred veterinarians literally manage poultry disease control in the United States. So the industry has long relied on their own

servicemen and non-veterinary experts for disease control."

While much medical treatment, including flock vaccinations, is routinely handled by lay servicemen, there are serious problems that threaten an entire flock and require the services of a trained veterinarian.

"When a serviceman can't solve a problem or there is the threat of an epidemic, he will bring us a sample of ill birds which are sacrificed. Then we conduct a necropsy examination to try to identify the problem before an entire flock is affected," explained Dr. Eckroade.

Frequently he and his staff are called out to the field, where they can get a first-hand look at management operations. Often they will select a group of ailing birds at the site for necropsies.

According to Dr. Eckroade, many infectious poultry diseases are nutritional in origin or management-related. While there are classic virus infections like Newcastle disease, infectious bronchitis, laryngotracheitis and fowl pox, for which vaccines have been used for years, there have also emerged in the past ten years, new diseases caused by reo and adeno viruses, about which too little is known.

Besides student instruction, the poultry laboratory also provides educational services to area poultrymen through poultry management programs at Penn State University and at local agricultural meetings. Responding to the needs of poultrymen locally and from New Jersey and New York, the laboratory will serve anyone who needs help with a poultry problem, including the owners of pet birds, which veterinarians are seeing more of, Dr. Eckroade noted.

"We charge the cooperative a \$10 fee per case. Sometimes two or three cases are brought in by a serviceman representing different problems on different farms," he said. "The small farmer is often unable to keep up with the state of the art and generally relies on a middle agent or serviceman."

"Since we don't want to discourage the backyard farmers from utilizing our diagnostic services, we don't charge them. Nor do we charge the pet bird owners, who are often distraught at discovering their expensive investment has contracted a disease."

"Our maxim is 'prevent the disease, rather than treat it,' which represents the epitome of disease control," said Dr. Eckroade. "One of the most important factors in controlling the spread of poultry diseases is sanitation. In some cases, humans are responsible for transmitting many poultry diseases from one chicken house to another. In our education programs, we stress the need for proper sanitary procedures in poultry houses. Disinfectant spraying of houses between flocks and wearing boots, a hat, and coveralls before entering and leaving the houses can prevent the spread of disease."

While noting that the backyard chickens are still a major factor in the outbreak of poultry epidemics, resulting in high mortal-

ity and economic loss, Dr. Eckroade has seen outbreaks in the big co-ops, too.

"We had an outbreak of disease in a large chicken house last fall," he recalled. "They lost about 10,000 birds and the cause was traced to visitors who came to look at equipment."

"We reiterate the importance of isolation-rearing management or what we sometimes refer to as 'don't let the clown in the chicken house.' Another cause of disease is the result of inadequate vaccination programs."

While Dr. Eckroade prefers and has a few of his own "backyard" chickens, he emphasizes that this method of raising poultry is no longer economically feasible. The modern approach to large-scale poultry raising operations has been attacked by animal rights groups as cruel and inhumane. In such operations, fowl are raised in close confinement, sometimes in wire cages. Their beaks





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are trimmed and artificial lights used to induce longer egg laying periods, increasing considerably their normal production.

"Grandma's chickens ran free, but they also laid far fewer eggs, and not uncommonly, were eaten by a fox or dog. If we had to survive on what Grandma got for her eggs, we'd be in economic trouble. Actually, the wholesale price for a dozen eggs hasn't changed significantly in twenty to thirty years," he noted.

The new intensive farm methods of raising fowl produce healthier birds but also permit the potential for serious outbreaks of disease because so many birds live together (30,000-80,000 per farm is typical in Pennsylvania). While close confinement can produce more stress, production managers can better monitor health, initiate treatment very early, and obviously, predators are no longer a problem.

With 80,000 birds typically being inoculated by lay servicemen, there is a serious

need to monitor vaccination programs to prevent future outbreaks of disease. Vaccines are administered in a number of ways, including individually by eye drop or wing web stab, which is expensive.

Other less expensive methods involve adding vaccine to drinking water or spraying the air of the chicken house, which is absorbed through the birds' eyes and lungs.

Research facilities of the poultry laboratory include twelve replicate "colony houses." These 14' x 14' wooden houses were donated to New Bolton Center about three years ago by CEVA Laboratories. Poultry industry donations were used to move them here from the Chicago area, and refurbish them with concrete floors, water, heat, electricity, and new roofs. Another two-room tight-isolation building was constructed four years ago. This building has a filter air positive pressure sys-

tem in order to work with more serious infectious diseases.

Although it is not yet on line, Dr. Eckroade anticipates the implementation of a new automated technology called "Enzyme Linked Immuno Sorbent Assay" (ELISA) system to monitor poultry for disease problems.

The advantage of ELISA over conventional laboratory tests is that it is far more sensitive and accurate. ELISA uses very small volumes of sera and is adaptable to an automated system thus enabling the laboratory to use larger sample sizes that can be analyzed in a shorter time period. The automated system can also provide a printout of test findings.

ELISA will be used for "flock profiling," health monitoring and disease identification and control. The technology will make it possible to conduct the tests in a few hours, which normally may take up to four or five days, in some conventional tests.

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