

# ABSTRACT NUMBER

1

**Student Author(s):** Ben G. Avery  
**Department(s):** Zoology  
**Teaching Mentor(s):** John Godwin/Zoology  
**Title of Presentation:** Crayfish Respiration in a Variable Environment

Respiration (intake of O<sub>2</sub> and expelling of CO<sub>2</sub>) is necessary for the survival of all animals. For aquatic animals that breathe through gills respiration is especially difficult because water contains approximately 30 times less oxygen than air does. This already compromised process can be made more difficult when factors like temperature, salinity, and pH are not optimal such that the water contains as much oxygen as possible. To compensate for this lack of oxygen aquatic animals have to actively pump water over their gills. When these organisms need more oxygen they simply pump more water over their gills. This teaching experiment addresses this process in an animal, the crayfish, which is native to North Carolina and respire using gills. Thousands of tons of crayfish are harvested annually in the state of North Carolina. For this industry to be successful, crayfish must be able to maintain respiration in a varying environment. A chamber was made that separates the anterior portion of the crayfish (where water is expelled after passing over the gills) from the posterior of the crayfish (where water is taken in). The amount of water displaced by the crayfish can be measured and a relative respiration rate can be determined (volume water displaced / time). Several factors affecting the relative respiration of the crayfish like water temperature, oxygen concentration, starvation, or pH variation can be studied using this method of determining the relative respiration of a crayfish. This information could be very useful to people attempting to maximize harvests crayfish or gauge the potential impacts of environmental degradation. This can also be a very beneficial educational tool. Students will learn about respiration challenges facing aquatic organisms and the factors affecting this process by performing this experiment.

# ABSTRACT NUMBER

2

**Student Author(s):** Emily J. Burdo

**Department(s):** Animal Science

**Teaching Mentor(s):** Kimberly Ange-van Heugten/Animal Science

**Title of Presentation:** The Effectiveness of Voluntary Practice Quizzes and Review Sessions on Student Quiz, Exam, and Overall Class Grades

The course Introduction to Companion Animals (ANS 105) exposes students to a wide range of detailed information about the physiology, reproductive and social aspects of companion animals, as well as, the interaction between humans and pets. This semester was a little different, however, because practice quizzes were made available on the course website to any student(s) who wanted to test their knowledge of the material before a quiz or an exam. Review sessions before each exam were also offered for this same purpose. The practice quizzes and review sessions were not mandatory for the class and did not contribute to the total grade; however, they gave the students extra practice on recently presented material. After collecting the quizzes the next step was to find out who did better on each exam, students who took the practice quiz or those who did not. After analysis of the exam averages and final grade averages, it was found that the students who took the practice quizzes had a higher exam average every time than those students who did not participate in the practice quizzes. I also looked at how the exam averages were influenced when taking into account the students who participated in review sessions before the exams. Those exam averages were also higher for students who participated than those who did not attend. Last of all, I measured the effectiveness of the practice quizzes on the students overall final average in the course. Once again, those students who participated in the practice quizzes had a higher overall course average than those that did not participate. The voluntary quizzes and review sessions were initiated to help improve student understanding of the course material and improved their overall grade in the course from 85.6 to 96.0, which was equivalent to one letter grade.

# ABSTRACT NUMBER

3

**Student Author(s):** Julie S. David

**Department(s):** Biological Sciences  
Food Science  
Nutrition

**Teaching Mentor(s):** Sarah L. Ash/Animal Science

**Title of Presentation:** Student Leadership in Service-Learning:  
Assisting in SL Course Design, Implementation,  
and Assessment

A new wave in the service-learning (SL) movement is student leadership opportunities, which can include being an assistant to a professor in a specific course either before, during, and/or after the semester of implementation. For my ALS 499H teaching project I worked with Dr. Sarah Ash and her SL enhanced “Community and Life Cycle Nutrition” course. One of the most significant barriers to having success teaching with SL is the need for instructors to completely rethink their courses with service-learning at the core, as opposed to adding it on to an existing course with a full load of readings and assignments. There is also much need for rethinking and revamping the courses each time they are taught based on the experiences and feedback from the previous semester in which they were taught, and also based on the changing needs of the community. This creates a large amount of work for faculty members, leading many to see service-learning courses as difficult and not worth the sacrifice of their time. The potential for student leaders to assist in much of this work is great. For my teaching project, in addition to leading reflection for the course, I assisted in much of the planning work for the class and the evaluation of what worked, what did not and why. It is my hope that as more faculty members see my project as a way to teach with service-learning and enrich the experience of an undergraduate by involving her in the planning process while cutting down on their own time commitment, they will consider teaching SL-enhanced courses.

<b>Student Author(s):</b>	Chase A. Helms Danielle K. McNeillie Burt V. Halbert Kathleen G. Pfeifer Jonathan L. Drew
<b>Department(s):</b>	Biological & Agricultural Engineering Biomedical Engineering
<b>Teaching Mentor(s):</b>	Mari S. Chinn/Biological and Agricultural Engineering Michael D. Boyette/Biological and Agricultural Engineering Scott A. Hale/Biological and Agricultural Engineering
<b>Title of Presentation:</b>	Single Unit Crushing and Fermentation System for Ethanol Production from Fruit Substrate

The presence of pharmaceutical and food processing industries in North Carolina has created a growing need for bioprocess engineers. The Biological and Agricultural Engineering (BAE) Department at North Carolina State University has identified this need and designed a curriculum to support the development of bioprocess engineers. To attract quality undergraduates into the department, student advisors attend recruitment events and inform prospective students about the bioprocessing program. Often interested students and parents begin to understand the bioprocessing field when visual examples are presented. In effort to help teach students about the bioprocessing area and the skill sets they will develop through the BAE curriculum, our group designed and constructed a fermentation system.

The fabricated system supports the preparation and microbial fermentation of a fruit substrate. This process begins with the crushing of a selected fruit substrate and separation of the juice from the solid particles. The juice is gravity fed into a reactor vessel (3L) that provides ports that allow for inoculation of the microorganism, addition of required reagents, sampling of the fermentation broth (for sugar/product analyses), exhaust of internal gases and instrumentation for important environmental parameters. A LabView program was written to continuously monitor pH, temperature and gaseous CO<sub>2</sub> levels, perform initial substrate pasteurization, and control substrate temperature over time. A user interface was incorporated to view the real time values of the sensors

and warnings for out of range readings. The user is capable of setting and changing the control parameters during the fermentation.

Overall, the designed system demonstrates the key concepts involved in fermentation and the importance of a combined skill set in biological and engineering sciences. In addition it is a great example of what learning outcomes engineering students graduating from the BAE Department can achieve.

# ABSTRACT NUMBER

5

**Student Author(s):** Ashley E. Ikard  
**Department(s):** Animal Science  
**Teaching Mentor(s):** Joan H. Eisemann/Animal Science  
**Title of Presentation:** Visualization of Lipid Digestion

In ANS 230, Nutrition of Domestic Animals, students learn about numerous aspects of nutrition, including the digestion and metabolism of various nutrients, such as proteins, carbohydrates, and lipids. This project has been focused on the processes involved in lipid digestion. Digestion of lipids is more complex because the lipids are not soluble in water. In order to allow students to better comprehend the steps present in lipid digestion, this educational video shows a break down of each step in the process.

The computer-related knowledge needed to accomplish this task was provided by Learning and Technology Services here at N.C. State through numerous workshops dealing with the computer programs Fireworks and Flash, which deal with graphics and animation, respectively. By using information from these workshops, as well as my previous knowledge of nutrition, the task of putting together all of the processes involved in lipid digestion into video form was easily accomplished.

The video begins in the lumen of the small intestine by showing the breakdown of a triglyceride into a monoglyceride and two fatty acids. This is followed by the monoglyceride and the fatty acids, along with bile salts, forming into a micelle. Next it shows the micelle breaking down, and the monoglycerides and fatty acids moving into an intestinal cell, and finally forming into a chylomicron. The chylomicron moves into the lymphatic system to be distributed to the rest of the body. Students will be able to access this video through the ANS 230 website, and it will hopefully aid the students in being able to describe and comprehend the steps of lipid digestion.

Through completing this educational video, students have been provided with an educational tool. Also, a great deal of information has been gained for my further use in school and in my future career aspirations.

# ABSTRACT NUMBER

6

**Student Author(s):** Daniel S. Kahl

**Department(s):** Molecular and Structural Biochemistry

**Teaching Mentor(s):** Charles C. Hardin/Molecular and Structural Biochemistry

**Title of Presentation:** Development of a Laboratory Exercise for the BCH 452 Teaching Laboratory Manual. Synthesis of a Duplex DNA Probe Fragment Using the Polymerase Chain Reaction

The purpose of this teaching project was to develop a new laboratory exercise for the BCH 452 teaching lab at NC State University, and to learn the procedures that are involved in the development of a laboratory exercise for a teaching lab. The purpose of the lab, entitled “Synthesis of a Duplex DNA Probe Fragment Using The Polymerase Chain Reaction” (Lab D.2) exercise is to introduce a Polymerase Chain Reaction (PCR) technique to the students. Additional instructions in the lab provide an improved method to develop the deoxygenin (DIG) probe used to label Tomato Golden Mosaic Viral (TGMV) DNA extracted from plant tissue. The DIG probe is used in the “Purification and Identification of a Plant Virus DNA” (Lab D.3) lab to mark a Tomato Golden Mosaic Viral (TGMV) genome on a Southern Blot. The students only performed the procedure for PCR on a Sindbis Viral fragment to introduce them to practices involved with PCR for Lab D.2; they did not make the DIG probe. For the probe in Lab D.3, the students were provided with a DIG probe prepared by Daniel Kahl prior to the lab exercise. For future labs the DIG probe for lab D.3 will be prepared by the instructor or teaching assistants prior to the lab exercise. The procedures for Labs D.2 and D.3 applied to the BCH 452 teaching labs in Dr. Hardin’s sections for the Spring 2004, Summer 2004, and Fall 2004 semesters with my direct involvement and assistance. Minor adjustments were made to Lab D.3 in addition to the development of Lab D.2 to help the process run more efficiently and explain possible results. Possible errors and improvements are reviewed in the discussion section of the report.

# ABSTRACT NUMBER

7

**Student Author(s):** Gulshan P. Karamchandani  
Carolyn Menzie

**Department(s):** Nutrition

**Teaching Mentor(s):** Sarah Ash/Animal Science

**Title of Presentation:** Implementing Nutritional Programs to Young  
Children Between the Ages of 9 and 12

This project was performed under the direction of Dr. Sarah Ash and we worked in conjunction with the Food Bank of North Carolina's "Kids Café Program." The Kids Café is an after school program for underprivileged elementary and middle school-aged children. The Kids Cafe provides the children with free tutoring and dinner two nights a week. It also sets aside some time for health and/or nutrition education. After meeting with the leaders of the Kids Café and discussing areas of nutritional importance for this particular audience, we came up with five main educational lessons. The five lessons were as follows: The Food Guide Pyramid, healthy eating, physical activity, a nutritional video, and an activity which allowed them to create their own food guide pyramids. Our purpose was to improve the nutrition and lifestyle of young children at the Kids Café by providing a guide to nutrition education so the children would be able to make healthy choices. As our research suggested, children learn better by hands-on experience so we made sure to fully involve the kids in each activity. To gauge the effectiveness of our teaching we provided each of the students with three questionnaires regarding basic health and nutrition practices. These questionnaires were then compared and showed a significant improvement in nutrition-related learning.

# ABSTRACT NUMBER

8

**Student Author(s):** Christa J. LaClaire  
**Department(s):** Biological Sciences: Nutrition Concentration  
**Teaching Mentor(s):** Sarah L. Ash/Animal Science  
**Title of Presentation:** Increasing Students' Awareness of How Obesity Is Used in Advertisements

Obesity has become an important topic of interest in American society due to its rapid rise to epidemic proportions (Trossman, 1). Although the number of obese people has increased to almost a third of the population, they are still the minority: an undesirable minority. As ever, thinness is the standard for attractiveness. Thinness in women symbolizes sexuality, intelligence and self control while thinness in men symbolizes power and financial security (Miller, 129). As the opposite of thinness, obesity therefore is used in advertisements to symbolize undesirability, ignorance, lack of self control, lack of power, and perhaps financial insecurity. A PowerPoint teaching module was created for Dr. Sarah Ash's Introductory Nutrition class to increase students' awareness of weight-related stereotypes that are associated with obese people, and to challenge the students to fight against holding weight prejudices of their own. Advertisements were collected from various magazine sources and incorporated into the class module that consists of a "one-minute" in class paper, a mini-lesson on weight prejudice, further practice on distinguishing weight prejudices in advertisements and concluding thoughts regarding how advertisers are using these prejudices to their advantage and to guard against having weight prejudice.

# ABSTRACT NUMBER

9

**Student Author(s):** Devorah A. Marks  
**Department(s):** Poultry Science  
**Teaching Mentor(s):** Samuel L. Pardue/Poultry Science  
**Title of Presentation:** The Gross Anatomy and Physiology of the Chicken

Poultry science graduates should possess a significant degree of knowledge regarding the anatomical aspects of birds. A supplemental tool for courses in the Poultry Science Department was developed, titled The Gross Anatomy and Physiology of the Chicken, to aid students in identifying the different organs and organ systems of the chicken. This CD-Rom includes images of the chicken ranging from the senses organs, the digestive system, and reproductive tracts for both male and female birds. The information includes embryonic development and the anatomy of the one- day old chicks and mature chickens. Every image is supplemented with information on that particular aspect of the bird.

I was the principal individual executing the project with the guidance of Dr. Sam Pardue. My tasks included gathering, organizing, and adjusting the images along with composing the CD- Rom. The experience has been extremely valuable and I have definitely enhanced my personal knowledge of the anatomy and physiology of the chicken.

**Student Author(s):** Jessica Matthews  
Perry Little  
Dragos Coles  
Rachel Reed  
Cassandra Schultz  
Sarah Seceast  
Danielle Thompson  
Joy Vonk  
Valerie Williams

**Department(s):** Biological Sciences  
Zoology  
Biochemistry

**Teaching Mentor(s):** Ken Esbenshade/CALS Academic Affairs

**Title of Presentation:** The Effects of H5N1 Avian Influenza

The Avian Influenza virus has been around for at least 100 years being extremely pathogenic especially towards farm bird population with a mortality rate of 100%. The first outbreak in humans occurred in 1997 at a bird market in Hong Kong, where the highly virulent and pathogenic strain H5N1 made the jump from chickens to humans. In February of 2005, the Center for Disease Control declared in a press release that the avian influenza is the biggest threat the world is facing right now?. With the disease showing a steady increase in prevalence, both in human and animal populations in the countries in southern Asia, scientists all around the world have been working vigorously trying to uncover the mechanism of a virus which, even though it resembles a general Influenza A virus in transmission, replication, and composition, is showing a dangerously high mortality rate in infected human population of approximately 30%. The biggest fear is the possibility of a mutation through antigenic shift that would allow the virus to jump from human to human, causing a pandemic of similar magnitude or even bigger than that of the "Spanish Influenza" in 1918 when almost 40 million people died around the world. With a relatively small incidence in human population, outbreaks of the H5N1 strain, mainly in bird population, have affected countries such as China, Cambodia, North Korea, Vietnam, and even Thailand. World trade and international tourism are hurting, public policies have been put in place, but the main question remains ?Are we ready to deal with an Avian Influenza pandemic, and unfortunately, the answer today is "NO."

**Student Author(s):** Christina M. Rush

**Department(s):** Animal Science

**Teaching Mentor(s):** Kimberly Ange-van Heugten/Animal Science

**Title of Presentation:** Non-Profit Organizations and Their Impact on Companion Animal Management

In Companion Animal Management, ANS400, management issues for Companion Animals are taught in depth. A common companion animal is the cat, *Felis Catus*. Feral cats are the offspring of stray or abandoned cats. They are raised without human contact and are considered wild. They form colonies where food is available and their overpopulation has become a normal community problem. (Operation Catnip Inc.) A common concern discussed in ANS 400 is overpopulation of stray companion animals. Most organizations, like Operation Catnip, that deal with these concerns are non-profit and run by volunteers. Operation Catnip tries to help the problem of overpopulation by using a technique of Trap-Neuter-Release, and by educating the community. This study researched Operation Catnip and analyzed the challenges a non-profit organization like this faces posing the question, do non-profit organizations help with managing Companion Animals? The hypothesis of this research was that yes, they would. By educating the community about overpopulation issues, and by continuing to spay and neuter the cats, population of the colonies should decrease, or at least would not continue to grow. Information from 1998 through 2004 was collected, and analyzed, and correlations are shown (Table 1). It was found that the cost of clinics tended to increase, while the number of cats being spayed and neutered tended to decrease. There are many reasons why this correlation could occur and future studies completed over a longer period of time will hopefully make this research less subjective. Regardless of the financial costs, it is thought by Operation Catnip officials that the reduction in cat numbers altered per year is a positive reflection that they are decreasing the feral cat overpopulation numbers. The dual effort of public education via courses such as ANS 400 and working to address management issues by non-profit organizations are vital to companion animal survival.

Table 1. Operation Catnip's total number of cats altered and financial information from 1998-2004.

Year	Males	Females	Total:	Total Revenue (\$)	Total Spent(\$)	Average Cost Per Cat (\$)
1998	na	na	na	16785	12051	na
1999	462	617	1079	15201	13321	12.4
2000	673	873	1546	19768	21207	13.7
2001	714	909	1623	19876	21045	13.0
2002	524	649	1173	37812	29038	24.8
2003	531	581	1112	28231	25346	22.5
2004	354	402	756	na	na	na
Total:			7289	Average:		16.7

References:

Operation Catnip Inc. "About Operation Catnip."

Operation Catnip. 2004.

Operation Catnip Inc. April 17, 2005.

<<http://www.operationcatnip.org/about.html>>

**Student Author(s):** Brynn S. Seabolt  
**Department(s):** Animal Science  
**Teaching Mentor(s):** Kimberly Ange-van Heughten/Animal Science  
**Title of Presentation:** Textbook Versus Applied Canine Breed Genetic Health Issues as a Teaching Aid for ANS 400

Companion Animal Management (ANS 400) is a course that focuses on care, management, and health of companion animals. Genetic diseases within purebred dogs are discussed in this course and I wanted to better understand these issues and their prevalence within my community so that this information could help teach dog owners in my area. The objective for this research was to first define the ten most common purebred dogs seen at a veterinary office in central North Carolina. Secondly, I wanted to find whether purebred dogs were being seen by veterinarians for their textbook health problems or for other reasons. Finally, if they were being seen for other reasons, I wanted to define these reasons and understand why the inconsistency existed. I used the record system at Asheboro Animal Hospital to search the 495 canines seen between February-March 2005. I obtained data on reasons these dogs were being seen and compared it to the hypothesized textbook health issues. The majority of pure-breed dogs seen within the practice did not exhibit the hypothesized breed problems. The exception was the Cocker Spaniel. 61.5% exhibited ear trouble, which strongly correlates with the hypothesis for that breed (Table 1). Of the ten most common breeds, seven experienced ear problems or allergies as their most frequent health issues, even for breeds that do not genetically have those problems. This potentially suggests that the ear/allergy problems could be contributed to factors other than breed genetics, such as climate. This research has allowed me to better understand the variation among dog breeds and the importance of proper animal care. With this new understanding I am able to use my classroom and workplace knowledge to educate concerned pet owners.

Table 1: Most common dog breeds & their health problems

Dog Breed	Primary Health Problem	Textbook Health Problems*
Boxer	Nothing Specific	Hips, heart, cancer
Chihuahua	Breathing	Kneecaps, heart
Cocker spaniel	Ears, allergies, arthritis	Eyes, ears, kidneys
Dachshund	Allergies, back	Back, eyes
Lab	Ears, UTI, lipomas	Elbow, eyes, hips
Poodle	Ears	Kneecaps, eyes, hip
Rottweiler	Hips/legs	Eyes, OCD
Schnauzer	Ears	Eyes
Shih-Tzu	Allergies, back, breathing	Back
Yorkie	UTI	Kneecaps

\* References available

**Student Author(s):** Jessica L. Seate  
**Department(s):** Animal Science  
**Teaching Mentor(s):** Kimberly Ange-van Heughten/Animal Science  
**Title of Presentation:** Wildlife: Diseases and Care

In Companion Animal Management, ANS 400, I learned to care for not only companion animals, but also wild and exotic ones. I learned about their behavioral characteristics and the diseases that affect them. Since communities are expanding and destroying animal environments, we are seeing huge amounts of stranded wild animals. Consequently, people are beginning to take in these wild animals and are ignorant of possible issues. I gained an understanding of these potential concerns via ANS 400 and I wanted to educate the public as to how to preserve wildlife.

The Piedmont Wildlife Rehabilitation Center (PWC) receives numerous calls asking what to do if a stranded or injured wild animal is encountered. I created a web page to educate the public as to how to react in this situation and how to become aware of the diseases animals carry and how important it is to not keep them as pets for human and animal safety. Disease education is extremely important especially when you come in contact with a wild or unfamiliar animal. For instance, two of the main diseases PWC treats are the zoonotic and potentially life threatening Aspergillosis and Salmonellosis.

This website development project complements ANS 400 because I have provided a knowledgeable source of information for the public to learn about wild animal care and management that can be incorporated into future ANS 400 semesters. Using the Internet to present this information was a natural decision due to the wide audience it reaches. Anyone in the world can simply search for wildlife information and via our technological society I can help teach them responsible animal care via my website. Hopefully this web page will help the animals, educate the public, and help those, like myself, whose future endeavors are veterinary animal care.

**Student Author(s):** Kristina R. Vester

**Department(s):** Biological Sciences  
Botany

**Teaching Mentor(s):** G. C. Van Dyke/Botany  
Gary Moore/Agricultural & Extension Education

**Title of Presentation:** Do Professors Who Teach With Energy and Concern Give Their Students More Motivation?

Educational research is a tool that is employed to aid in the understanding and development of valuable teaching methods. Students are inclined to be more motivated when teachers are energetic and care for them as opposed to teachers who do not possess the same teaching characteristics. The objective for this project was to evaluate the correlation between a professor's enthusiasm and empathy for each student and the student's success in the class. It was believed that both high performing and low performing students would show academic success when the teaching characteristics being researched were employed. Two professors that were well known for their inspiring and inventive teaching styles were chosen for our study. Students enrolled in each professor's class were asked to participate in a survey and allow the researcher to access their university grade point average and class grades. The survey presented the students with opinion questions asking them to rate the professor on a scale of one to four using choices of strongly agree, agree, disagree or strongly disagree. The questions asked the students to evaluate how they felt their professor exhibited the enthusiastic and caring traits while teaching. The student responses were compiled and correlated along with their expected class grade and actual class grade. Students were also divided into groups based on their academic performance (average gpa) to see if lower performing students actually performed better when motivated by their professor. Further results of this study will be discussed.