

success in the classroom and increase the probability of success in future professions. Finally, future research should focus on measuring the technical communication competencies of United States and international graduate students by using standardized tests.

Bibliography

¹Chung, Chew-wah. 1980. "Communication Practices and Needs of Graduate Foreign Students." integrated paper to fulfill partial requirements for the degree of Master of Agriculture, University of Minnesota. pp. 1-37.

²Cieslak, Edward C. 1955. *The Foreign Student in American Colleges*. Wayne University Press, Detroit.

³Pavelich, Joan. 1978. "Organizing Special Classes for Foreign Students in the Technical Writing Course." *The Technical Writing Teacher*, N 5, 55-58.

⁴Pytlík, Betty. 1978. "Teaching Technical Writing to Foreign Graduate Students." *The Technical Writing Teacher*, 5, 53-54.

⁵Schwab, William. 1960. "The Problem of the Advanced Student in American English." *Language Learning*, 10, pp. 151-56.

⁶Stecklein, John, et al. 1971. "Attitudes of Foreign Students Toward Educational Experiences at the University of Minnesota." Bureau of Institutional Research, University of Minnesota, Minneapolis.

AN UNDERGRADUTE COURSE

Behavior and Management of Domestic Animals

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Animal Science curricula were originally designed for students having considerable experience with different species of livestock, students from the diversified family farm. However, in recent years the background of students has changed dramatically with the specialization of farming and the influx of students from non-farm backgrounds. Even students from rural backgrounds usually have experience with only one or two species. The present trend toward confinement and more intensive management is further reducing experiences which give students an understanding of the ethogram (behavioral repertoire) of a species. Paradoxically, the trend toward larger herds or flocks, increased confinement, and more intensive management requires an increased knowledge of behavior to avoid costly problems. The traditional curriculum offers students little exposure to the behavior of domestic animals. As G.C. Anderson (1974) observed,

"the pragmatic aspects of behavior are an integral part of classic and contemporary production and management courses. This treatment cannot, however, provide an understanding of the basis of behavior and accordingly imposes a constraint on a student's ability to anticipate and solve problems. More importantly, the integrative potential in the study of behavior is largely denied."

The reduction of animals to a series of biochemical reactions, which the immense growth of knowledge during the last century has made possible, must be balanced with a holistic consideration of the individual or group and the interactions of individuals or groups

with one another and their environment. We must ensure that students have a realistic perception of livestock and poultry. "For most practical purposes, one or two sheep are not 'sheep'." (Kilgour, 1972).

Rising costs of land, labor, building materials, and energy demand the consideration of behavioral variables to avoid costly mistakes in facility design. Animal science students must be taught how behavioral variables affect production and to consider these variables in the planning of facilities, management systems, and experimental designs. Concurring with McBride (1973), we must design the farm to fit the animal if production is to be optimized and stress minimized.

Sixty-five percent of the students taking Animal Science courses at Texas A&M (based on survey data of students taking animal nutrition, courtesy of Dr. Howard Hesby) consider veterinary medicine as a career goal. Veterinarians as well as animal scientists must have a good working knowledge of the behavior of the domestic species. For many students accepted into veterinary school in their junior year, their only exposure to livestock may be an introductory Animal Science course. Since upper level production courses are limited to single species, they cannot give students an appreciation for the similarities and differences among the domestic species which are relevant to their handling and management.

Federal and state guidelines for the care, housing, shipment, and slaughter or euthanasia of laboratory and farm animals are increasingly becoming a necessary consideration. The efficiency of American agriculture, which enables so many people to be fed by so few, also allows a large proportion of the population to remain relatively ignorant of food production. It is vital that more people with an understanding of livestock behavior participate actively in any legislative decisions regarding farm

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* The scientific study of animal behavior. It also implies the animal is being studied in its "natural" habitat (i.e. farm) and its behavior will be related to how the animal functions in its environment.

animal welfare and work to protect American animal agriculture. Students must also be introduced to the range of philosophies of people outside agriculture which will affect major decisions within the field.

Course Description

"Behavior and Management of Domestic Animals" is offered fall and spring semesters and one summer session. The three hour course consists of three basic components:

- I. formal "class"
- II. a weekly 2-hour laboratory
- III. term project ("Doing your own thing")

The introductory animal science course is a prerequisite. Much more emphasis can be placed on behavior if students have at least a basic knowledge of livestock production. Psychology and sociology courses are of relatively little help since we take a completely different approach to behavior.

I. Class

Encouraging student participation and interaction in class has not been a problem. In fact, at times it is difficult to limit student participation in class. Students can have a wealth of knowledge, especially those who have had considerable experience with one or more species. Soliciting experiences of West Texas cowboys keeps everyone stimulated and impresses the student from a Houston suburb with the variability of behavior and the applicability of the topic. In other discussions, even the more experienced students mutter "so that's why they do it."

The subject matter covered during class is organized into three major sections:

	Approximate Class Hours Spent on Topic
I. The Basics of Animal Behavior	
A. Some History	.5
B. Basic Components	.5
C. The Physiology of Behavior	1.5
D. Perception	1
E. Socialization	1
F. Behavior and Domestication	.5
G. Animal Intelligence	.5
II. General Topics Across Species	
A. Stress	1
B. Thermal Regulatory Behavior	.5
C. Spatial Requirements and Crowding	.2
D. Nutritional Wisdom	1
E. Principles of Training Animals	.3
F. Animal Welfare and Ethics	1
III. Species Specific Behavior and Its Application to Animal Production	
A. Behavior of Sheep and Goats	5.5
B. Behavior of Predators	1
C. Behavior of Cattle	8
D. Behavior of Swine	6
E. Behavior of Horses	6
F. Dog Behavior Applied to Livestock Production	1

The Basics of Animal Behavior is covered at the beginning however the order of the subsections of the other parts may vary each semester. The sections on Stress and Animal Welfare have been found to be better understood if covered at the end of a semester when the students have an understanding of the similarities and differences among species and how these behavioral characteristics relate to efficient management and contemporary ethical issues.

The order of discussing the species sections, which make up 70 percent of the course, varies with availability of animals for use in the laboratories and seasonal factors. For example, swine are covered during the winter since they are largely housed indoors, but the sheep section is timed to coincide with either the breeding or lambing season, depending on the semester.

Major goals of the course are to 1) have students learn about the whole animal or group, 2) to feel comfortable working with the animal, and 3) to acquire some empathy for each species. Hence, the subject matter is primarily organized by species rather than by the comparative approach. Approaching the course by behaviors could disrupt the continuity required for a good perspective of each species as a whole. The comparative approach is reviewed at the end of each semester after students have some knowledge of each species. Emphasis is on understanding each species and being able to integrate knowledge to answer realistic contemporary problems. This is the holistic approach advocated by Anderson (1974). Hafez's (1975) **The Behavior of Domestic Animals** is organized by species but has proved too advanced for this level course. Craig (1981) has recently published an excellent text using the comparative approach. These texts are provided as supplemental reading assignments.

A 220 page set of lecture notes and supporting articles serves as a text for the course. The notes have been extensively revised every year for the last four years. They were designed to reduce the amount of note taking and thereby increase opportunity for discussion in class by providing an outline of many of the topics and tables and listings of the more mundane facts students are expected to know. Several of the most interesting topics are omitted from the notes to encourage student attendance. Some topics are also written out for students to read on their own. Supplemental handouts informing students of current issues and research are 3-hole punched to facilitate integration into the notes. Research and popular articles are also reproduced, including: Feist and McCullough's (1976) **Behavior Patterns and Communication in Feral Horses**; B.F. Skinner's (1951) **How to Teach Animals**; and Hartsock and Graves' (1976) **Neonatal Behavior and Nutrition-related Mortality in Swine**.

In 1980, the National Science Foundation awarded the author a grant for the purchase of equipment to make videotapes on animal behavior for this class. To date, approximately forty hours of videotape, segments

of which are used in almost every class meeting, have been made. A list of videotapes is available from the author. Students can gain experience with this equipment through individual projects. Slides and videotapes enable students to see behaviors as they are discussed. They also enable the demonstration of behaviors which may be seasonal or difficult to get animals to demonstrate "on cue" and the illustration of facilities which are not available locally to visit.

II. Laboratory

Laboratories consist basically of two types: outdoor labs for working directly with animals; or videotape/film sessions with discussion. The outside laboratories may involve experiments with animals, observational studies, or field trips, which then are the basis for discussion. Every effort is made to maximize individual student contact with animals. When doing experiments on maternal behavior in sheep, for example, each student handles and leads a lamb or ewe; when relating competitive behavior at the feed bunk to milk production, body weight, and age in dairy cattle, everyone must halter his or her individual cow and maneuver it over a deliberately (unbeknownst to the students) difficult route to where the experiment will occur. When studying neonatal pig behavior, every three students are assigned a litter and required to weigh and identify each pig before collecting data. Studying farrowing and early neonatal behavior is one of the "do on-your-own" laboratories. It is scheduled when a large number of synchronized gilts and sows will be farrowing. Students check for signs of approaching farrowing, returning to the Swine Center until they have observed farrowing and behavior of the newborn pigs. Hartsock and Graves (1976) **Neonatal Behavior and Nutrition-related Mortality in Swine** supplements the laboratory perfectly. Instructors and Swine Center personnel are almost always present to answer questions and keep the students involved. Due to the small groups of students present at any one time and its informal nature, this has proven to be an excellent icebreaking laboratory. Students often bring roommates and friends and some stay the whole night. The flexibility in choosing when they come appears to increase the amount of time the students devote to this lab — often several times over the required minimum.

We continuously experiment with outdoor laboratories, trying one or two different exercises or experiments each semester. When expected results are not obtained, possible reasons are discussed. These laboratories are approached as experiments to determine how the animals react and to illustrate causes of variability in behavior. The experimental labs also provide opportunities to broaden general knowledge while exciting the students by involving them in the process of scientific discovery.

Two or three laboratories are allocated to each species, of which one may be a videotape/film discussion session. This permits showing many aspects of behavior,

especially seasonal behaviors in the off season, that cannot be presented live. Some laboratories are species-specific while others integrate behavior of several species. The laboratory utilizing stock dogs accomplishes both. This laboratory is a favorite with students and is an excellent demonstration of many important behavioral principles. Training and handling of stock dogs is covered at length along with discussion of genetics and behavior, critical periods in ontogeny, and principles of learning. Demonstrations of herding cattle, sheep, goats, and swine illustrate species differences for behavioral characters such as flight distance, response to predators, flocking tendency, and maternal defense. The laboratories also create an opportunity to give students more individual attention, and the casual atmosphere encourages questions and discussion from shy students.

III. Term Project

Students are required to conduct a term project of their own design. The project gives students another avenue for the expression of their capabilities and an opportunity to utilize special individual interests and abilities. Projects involving observation or manipulation of livestock are encouraged; however, conventional literature search term papers are permitted. A liberal choice of topics is allowed to encourage independent work, ideas, and observation. All students are required to have at least one planning session with the instructor to obtain project approval and to receive guidance on how to take field notes; what university equipment, facilities and animals are available for their use; contemporary issues and problems; where to look in the library, and classic references. Students are encouraged to discuss their projects with the staff throughout the semester, which creates more opportunity for individual attention. Students planning to do graduate work can gain experience in research methods while others may be stimulated to contemplate graduate work.

The originality and quality of some of the term projects have been rewarding to the instructors, reinforcing their enthusiasm and creating inspiration for teaching. The projects allow the instructors to learn from students and have broadened the instructors' knowledge. The sometimes surprising discrepancies between some students' performances on exams and the abilities reflected by their term projects help the instructors to avoid unconscious stereotyping.

A more personal knowledge of students enables instructors to give more individual guidance and to write more accurate and informative recommendations.

Student Attitudes

Thirty students (those attending the last class of the semester, Spring, 1981) were asked to fill out questionnaires on their backgrounds and opinions of the course. These were in addition to the standard course evaluation forms designed to critique the teacher. Since this is a sophomore/junior level course, these questionnaires were not distributed to seniors. Table 1 shows the influence of

TABLE 1. Influence of Background and Career Objectives On Student Ratings of the Course.

	Background					Objectives
	Metropolitan/ Suburban	Hobby Farm ^a	Commercial Farm	Animal Production	Veterinarian	Agricultural Related Field ^b
Usefulness of course ^c	1.4	2.0	2.3	2.0	1.36	2.4
Recommend to person ^d of similar background and interests	1.1	1.6	1.8	1.7	1.1	2.2

^a hobby farm was defined as not being a major source of income.
^b not involving direct contact with animals.
^c mean of ratings on a scale of 1 (extremely valuable) to 5 (useless).
^d mean of ratings on a scale of 1 (strongly recommend) to 5 (not recommend).

background and career objectives on the usefulness of the course and whether students would recommend it to someone with a background similar to theirs. Students from cities and suburban areas and those interested in a veterinary career found the course to be of most value. Students from agricultural backgrounds valued the course slightly lower, though still above the average college course. Students with a career objective of working in an agricultural related field not having direct contact with animals rated the class the lowest, though still higher than "average."

When asked what laboratory or portion of a laboratory was most enlightening ("something you will remember for years"), 44 percent of the students with agricultural backgrounds cited a laboratory involving a species with which they had more than four years experience. Apparently, even students who have often observed the behaviors discussed in class frequently do not know the reasons animals exhibit a particular behavior.

"Should the course be changed to 3 hours of class with more videotapes and no laboratories?" was answered with a unanimous "No." "Should we use more videotapes on behavior?" received a mean rating of 2.1 on a scale of 1 (use more) to 5 (use less). The number of videotaped vs. "live" laboratories is a difficult decision. An important consideration is the quality and appropriateness of the visual aids. Though an immense amount of material can be covered through visual aids, they are never listed by students as "one of the laboratories that was most enlightening, something that will be remembered for years." Therefore we strive to use visual aids primarily as an accompaniment to lectures or a supplement to labs.

Discussion and Conclusion

The Undergraduate Applied Animal Ethology* program in the Animal Science Department at Texas A&M University was initiated in 1978. It has been well received by students. The course described in this paper is especially useful to students when taken after the introductory Animal Science course and before the upper level production courses. Since all major species are

covered, students who have not decided in which species they would like to specialize or whether they even want to work with animals are specially benefited by such a course. Since this is a sophomore/junior level course, it provides students with an opportunity to take an animal science course which helps maintain their interest in animal science during a period when they are taking the basic prerequisite courses.

The student opinionaries showed that even students with an agricultural background found the class rewarding. Such a course is often considered as primarily remedial for students without farm backgrounds, but this view is not supported by the opinions of students enrolled in the course.

A close communication between the instructors of our production courses and student feedback helps eliminate overlap of subject matter. For example, students in our horse production course are required to observe foaling; hence, the parturition and neonatal behavior laboratory utilizes farrowing as a model. Observing farrowing is not included in the swine production course.

Applied Animal Ethology is just emerging as a field in agriculture. For example, the international journal, **Applied Animal Ethology**, which deals with studies of the behavior of all domesticated animals, started in 1974. This field is rapidly evolving and an ever increasing number of Colleges of Agriculture are recognizing the need for such a program. Of 83 departments of animal, dairy, or poultry science responding to a survey of animal behavior and teaching programs, fourteen offer a course on animal behavior. Twenty-six respondents indicated that an increase in behavior research or teaching activities was being considered (Stricklin, 1981).

Literature Cited

- Anderson, G.C. 1974. Old Wine in a New Skin or Animal Behavior in the Modern Animal Science Curriculum. *J. Anim. Sci.*, 39:441-445.
- Craig, J.V. 1981. **Domestic Animal Behavior**. Prentice Hall, Englewood Cliffs, N.J. 364 pp.
- Feist, J.D. and D.R. McCullough. 1976. Behavior Patterns and Communication in Feral Horses. *Z. Tierpsychol.*, 41:337-371.
- Hafez, E.S.E. 1975. **The Behavior of Domestic Animals**. 3rd Ed. Williams and Williams Co., Baltimore, MD.
- Hartsock, Thomas G. and H.B. Graves. 1976. Neonatal Behavior and Nutrition-Related Mortality in Domestic Swine. *J. Anim. Sci.*, 42:235-241.
- Kilgour, R. 1972. Behavior of Sheep at Lambing. *N.Z. J. Agric.*, 125:24-27.
- McBride, G. 1973. Fitting Farms to Fowl. Proc. 16th Ann. Australian Poult. Conf., pp. 1-5.
- Skinner, B.F. 1951. **How to teach animals**. Scientific American Offprint 423.
- Stricklin, R. 1981. Domestic Animal Behavior Survey Results. *N. Amer. Appl. Anim. Ethology Newsletter*, 1:2.