

## ***Section XII: Appendices***

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### ***Appendix A: Last Comprehensive Review Report, 1990\****

#### **Introduction**

A comprehensive review of the research, teaching and extension programs in the Department of Animal Science at the University of Minnesota was conducted December 10-13, 1990. The review team consisted of five members from Agricultural Experiment Stations, one from the College Veterinary Medicine at the University of Minnesota and a team leader from the USDA-Cooperative State Research Service. The team represented disciplines and areas of expertise corresponding to the programs in the Department of Animal Science.

Animal agriculture production is very important to the state of Minnesota. Cash receipts for all livestock and products are approximately \$3.5 billion annually which represent over 50% of the cash receipts from agricultural products in the State. Minnesota ranks second among all states in total cheese produced and turkeys raised, third in hogs marketed and fourth in milk production. In addition, a significant number of eggs and sheep are produced on Minnesota farms.

#### **Organization and Leadership**

The Department of Animal Science has been a comprehensive department including animal, dairy and poultry science since 1966. The department is challenged with the diverse needs of the livestock and poultry industries in the State. In order to meet these demands, the department must provide scientific and educational leadership to the animal related industries in the state and region. Considering the magnitude of the contributions of livestock to the state, the current size of the department is not as large as many departments at universities in states with comparable livestock industries.

The department consists of a professionally mature faculty including 25 professors, 7 associate professors, and 8 assistant professors. In addition, currently there are 3 vacancies in the department. Most of the faculty members hold joint appointments in two or more areas of responsibility. The majority (i.e. 33) of faculty members are located on the St. Paul Campus, whereas, the remaining 7 are located among 5 Branch Stations.

Dr. Richard D. Goodrich, Department Head for the past 7 years, has a sound professional background in the animal sciences. He is highly respected by the members of the faculty, other Department Heads on campus, students, and support employees in the department.

The Department of Animal Science developed the following mission statement: "Through education and research, we serve people by providing continued improvements in the efficient and humane production of animals and wholesome animal products." This mission is consistent with and contributes to the overall mission of the Institute of Agriculture and the mission of the University.

The department operates under a system of shared responsibility by the Department Head and the faculty. Faculty members, civil service employees, and students participate in the development of policies, plans and programs in the department. Standing committees include: Consultative; Tenure, Promotion and Salary Adjustment; Graduate Studies; Undergraduate Studies; Grievance; Seminar; Social; Animal Welfare; and Awards.

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\* U.S. Department of Agriculture, Cooperative State Research Service, Comprehensive Review, Research, Teaching and Extension, Department of Animal Science, University of Minnesota, December 10-13, 1990.

This democratic and participative mode of operation has helped bring about confidence in the decision-making process in the department. The Head is commended for encouraging this participative involvement. However, in order to facilitate decision-making and departmental operations, the Department Head, at times, should exercise his best judgment and make decisions on topics such as retrenchments and budget allocations.

In general, communication within the department appears to be satisfactory. However, communications are hampered in many instances due to the fact the members of the department are located in four different buildings on the St. Paul campus and at five Branch Stations throughout the State.

The review team makes the following suggestions for improving the effectiveness of the department.

The review team has concern about the age distribution of faculty in the department. A large number of the faculty members are approaching retirement age in the near future. The department should consider filling selected vacancies with associate professors rather than assistant professors to take advantage of their experience and stature in the scientific community. This is particularly important considering the small number of associate professors currently in the department.

The review team also noted the abundance of University of Minnesota graduates on the faculty. Nearly one-third of the faculty members have a Ph.D. from the University. In addition, several faculty members have received all of their degrees from the University of Minnesota. A deliberate effort should be made to broaden the base of training and experience as new faculty members are recruited and employed. Several expected retirements in the next few years will provide the opportunity to recruit additions to the faculty from a wider selection of academic institutions. The review team recommends that the members of the department take advantage of the single quarter leaves and sabbaticals to strengthen existing programs by investigating new approaches and techniques.

The proposal to merge the food producing animal programs in the Department of Animal Science with the food producing programs in the College of Veterinary Medicine was examined. This proposed alliance should strengthen the research, extension and teaching programs in the department and is encouraged by the review team.

The following specific suggestions are offered for improvement of communications within the Department of Animal Science:

1. Develop an informal "Newsletter" for distribution within the department on a weekly basis.
2. Establish an organized seminar series to include presentations by graduate students and faculty. This would encourage a broader representation of graduate students and faculty members.
3. Encourage the Social Committee to develop additional informal social events particularly for the graduate students across the various programs and buildings.

## **Facilities and Equipment**

The Department of Animal Science is housed in four buildings on the St. Paul Campus at the University of Minnesota, namely; the Andrew Boss Laboratory of Meat Science, Animal Science/Veterinary Medicine, Haecker Hall and Peters Hall. Although each building has offices, lecture rooms and laboratories, there is considerable variation in the degree of modernization. When new construction or remodeling budgets are proposed, emphasis should be placed on consolidation of the department into one building with state-of-the-art teaching and research support equipment. During modernization there should be assurance that electronic assisted teaching becomes a priority.

The animal facilities to support research and teaching at St. Paul and Rosemount appear to be excellent. The facilities meet current research needs, as well as meeting the welfare of the animals housed in those units. The recent improvements in the dairy, swine and poultry housing along with the addition of an animal waste composting facility on the St. Paul campus provide an opportunity for obtaining excellence.

Based on the overview of facilities at Crookston, Grand Rapids, Morris and Waseca Branch Stations, the facilities appear adequate for most of the proposed work. There may be a need for remodeling if one dairy unit is closed and two swine units are combined. If the Grand Rapids swine unit is closed, an effort should be made to ensure that a similar type facility for environmental studies (e.g. for nursery and sow gestation research) be made available at another station, probably Morris.

The department appears to have adequate microcomputer and main-frame computer access to meet accounting, word processing and data analysis needs. The undergraduate students seem to be amply meeting their computing needs through the use of a fee-card arrangement.

## **Program Support**

The departmental programs require substantial support personnel due to the extensive farm and laboratory operations and the dispersed nature of the physical locations of faculty members. Present numbers of full time support staff appear adequate. They include: 25 barn staff, 4 administrative staff, 8 clerical staff, 14 scientific staff, and 1 meat laboratory supervisor.

Currently there are 33 (1/2 time) graduate assistantships in the department. Additional assistantships are funded by external grant funds. With the present St. Paul faculty at 33 members, the available assistantship support is reasonable. The appropriate allocation of the 33 graduate assistantships, that attract qualified students and support productive faculty members, is very important to the department, especially when resources are limited.

External funding from industry to the department is substantial and the members of the faculty are to be complimented on gaining such funding. Much of the applied research probably would not be conducted in the absence of such industry support. However, more attention should be paid to assuring that sponsored research is funded at a level to cover a reasonable proportion of the total costs. A more intensive search of State and Federal funds might be warranted in order to decrease excessive dependence upon industry funding.

Further multi-disciplinary funding efforts should improve the chances for obtaining grants. Programs such as the USDA National Research Initiative encourage multi-disciplinary proposals. Budgets for major grant proposals should include an appropriate balance between post doctoral and graduate assistantships.

Members of the review team met with approximately 15 support staff including clerical staff, farm managers and research technicians. There was an overall positive feeling expressed by the group. Morale in the department is better in comparison to two years ago. The support staff greatly appreciated the Department Head's quarterly meeting with them. Communication about departmental issues and concerns has greatly improved. Most staff members felt comfortable going to their supervisor if they had a concern or a suggestion for improvement. Positive aspects of their work included new challenges, working with students and providing service to the public. The location of people in 4 buildings was addressed as a major barrier to communication in the department.

Availability of library, computer and statistical services to students and staff is satisfactory. The clerical staff were very satisfied with the equipment provided for their work. Professional development opportunities for support staff can enhance job satisfaction and performance. Efforts should be made to assure that staff have appropriate opportunities to enhance professional skills related to their jobs.

## **Research**

### **Reproduction**

This is a strong research group which provides 1.5 FTE's in teaching and 3.5 FTE's in research. None of the five scientists have a budgeted extension appointment but they all have been active in outreach programs, especially related to the very technical aspects of reproduction problems across several species.

Collectively the group has published over 100 papers in refereed journals during the past five years; generated over \$800,000 in gifts and grants; taught at least 4 different courses; and trained 5 M.S., 4

Ph.D. and a few postdoctoral students. The review team considers the training of only 9 graduate students over a 5 year period inadequate in view of the 3.5 FTE's for research and the level of grant funding.

Each of these scientists have been involved with research programs that are relevant to their respective species of interest. They are encouraged to focus on not more than two specific areas of interest in order to maintain an appropriate level of depth and competence.

### **Growth and Muscle Biology**

The accomplishments of the growth and muscle biology group and future research plans for the group are major strengths of the department. There is good leadership among the group and strong evidence of effective interaction both within and outside the department including positive collaboration with faculty members located at the Branch Stations.

Research objectives presented were focused and the sequence of investigations toward the testing of hypotheses appear to be appropriate. The clear goal of assuring that research be directed at food producing animals is commended. Additionally, the balance among whole animal, tissue and molecular approaches should be continued.

The work with selected lines of dairy cows is unique, especially since these lines (large and small body weight and selected for high milk yield) are not available elsewhere. The proposed studies involve some rather routine experimental measures to assure metabolic and hormonal differences among lines. Hopefully more refined studies such as the measurement of receptor numbers and/or physiological mechanisms and other intensive studies can be developed. The refilling of the molecular biologist position is essential and could bring an added dimension to this work as well as to other areas in the department. The proposed alliance with the College of Veterinary Medicine should prove useful, by giving access to molecular biology expertise and equipment located there.

Work on muscle growth and differentiation at the tissue level, is well coordinated between the two faculty members. Emphasis should be given to assuring that each investigator has a portion of effort that is truly independent and non-overlapping. The decision by one member of the team to take an internal sabbatical leave in the Department of Biochemistry is excellent. The expertise gained will greatly help move the muscle growth research into key areas utilizing techniques of molecular biology.

The molecular biology program involving poultry, sheep and fish is very productive and involves excellent collaboration with other laboratories on campus. The studies using gene cloning, gene mapping and gene transfer, although ambitious, bring an important added degree of basic science to the department. The fish experiments are well funded and reveal strong leadership by the scientist. Even though funding is most readily available for work in gamefish, it is recommended that future efforts continue to emphasize poultry or other food producing animals. The knowledge, gained using fish as the model or tool should be related to future studies with farm animals in the department. Hopefully funding can be obtained for poultry studies from other sources such as the USDA National Research Initiative.

Though six faculty members were identified as the growth and muscle biology group, other faculty members in the department could be considered part of this overall effort as well. For example, the very productive and pertinent research program on improving protein utilization in ruminants (reported within the "dairy production systems" section) has direct relevance to basic mechanisms of nutrient utilization for the whole animal productive functions: growth, reproduction and lactation. Overall, the review team considers the growth and muscle biology program area very strong. It appears that there is a high probability for future success in attracting graduate students, gaining external funding and producing unique scientific discoveries.

### **Animal Production Systems**

Animal production systems research is the most closely linked to the production sector, thereby very visible. The animal production systems research group includes faculty members with diverse disciplines (ranging from nutrition to genetics) within an animal species group. While this type of grouping should foster multi-disciplinary research efforts, not only among faculty within the department but also with

various other departments, there is little evidence that multi-disciplinary research is currently taking place. There does however, appear to be a good working relationship between faculty members at the Branch Stations and those on the St. Paul campus.

### ***Beef***

The research program in production systems for beef has tremendous expansion potential with the recent hiring of several new faculty members. Collaboration appears to be satisfactory among the members of the group. The proposed research objectives for the next five years appear to be overly ambitious considering the relatively low level of FTE's committed to research in this area. It is recommended that the faculty member on campus focus the majority of his research into no more than two areas of importance to the Minnesota beef industry, and that he establish close ties with the more basic scientists in the area of growth research.

The review team recommends that the newest faculty member be encouraged to look at economically important areas of research for the Minnesota beef industry and prioritize activities along these program areas. The current research plan appears to be too divergent and involves too many areas for a minor research appointment. The development of an on-campus genetic evaluation for large beef herds on the Cray II supercomputer should be evaluated carefully relative to duplication of other already existing programs in the United States. The relative economic impact on the U.S. beef industry of smaller beef breeds should be assessed before embarking on an on-campus large beef herd evaluation program.

Dairy-beef production is also very important in the State. Efforts should be made to expand dairy-beef research and to establish a strong extension program related to this research.

Veteran members of the beef research group have an acceptable publication record over the past five years given the shortage of faculty members in this area. Expansion of beef-forage efforts at the Grand Rapids Branch Station, with the appropriate interdepartmental and interdisciplinary ties, should be encouraged.

### ***Swine***

The Minnesota swine industry is a very important part of the State's agriculture. Swine production constitutes the third largest animal commodity in the State, based on cash receipts. Minnesota ranks third in the nation in swine production. More importantly, it ranks second only to North Carolina in rate of growth of the industry.

The swine producers in the State are very well organized, vocal and politically effective. They hold close ties to and high expectations of the University's role in their commodity. Because of this, it is essential that the Department of Animal Science maintain a vigorous, highly visible swine research and education program.

The overall swine program in the department has suffered recently due to faculty vacancies. Only one of the two swine nutrition positions (formerly Moser and Cornelius) has been filled and another position has been slated for closure. The review team strongly recommends that the existing position be filled with a swine expert, either in basic nutrition, environmental physiology/behavior, reproduction, or genetics. Serious consideration must be given to the fate of the existing genetic herd at Rosemount. The valuable research at that location could be redirected and invigorated if the position was filled by a faculty member with expertise in physiological genetics.

The department is applauded for maintaining a viable research program in spite of reduced resources. The Branch Station personnel (Chester-Jones and Johnston) should be commended on their participation in ambitious research programs. Future involvement is encouraged. However, there needs to be special emphasis on assuring that tenure-track faculty members at the Branch Stations have the opportunity to be appropriately involved in graduate training (e.g. advisors/co-advisors of graduate students). Positive efforts were evident in this regard. Also, some funding for graduate student support from the Assistant Director's office or Branch Stations is justified in order to supplement partial support offered by the department.

The senior faculty are also commended on the redirection of their research efforts towards more fundamental research. The review team recommends that the faculty members involved in the animal modeling research establish well-defined intermediate objectives and definite deadlines for achieving the final objectives. This would help guarantee that modeling studies achieve specific tangible benefits. It is encouraging to note that some of the younger faculty are interested in systems analysis. The proposed alliance with the College of Veterinary Medicine should facilitate this area of research.

### ***Chickens***

Research on chickens (broilers and layers) primarily involves two faculty members with a total of 0.38 FTE for research. Those conducting this research are also heavily involved in teaching and extension programs. Most of the research is applied in nature, funded by industry and allied industry groups, and is focused towards industry-oriented programs. Jointly, the two individuals have obtained over \$1.3 million of industry support over the past five years for these programs.

Facilities for broiler and layer research are excellent. Nevertheless, even though all of the research being addressed is important to the industry, it appears that the individuals involved are attempting to conduct studies in too many areas to become national leaders in any one research area.

Layer research is obviously expensive and funding from the egg industry is scarce. A vigorous effort should be made by the researchers and the Department Head to solicit continued funding for this program from several sources including; the major poultry breeders, Minnesota egg integrators, and allied industry groups. Broiler research is already being funded by industry. Care should be taken, however, to insure that adequate funds are being sought to cover the departmental costs associated with the level of broiler research involved.

Considering the low level of research appointment for the individuals involved, the publication record from this area in recent years has been very commendable. The team is also very supportive of the Avian Center concept. The proposed merger with the College of Veterinary Medicine should help facilitate avian research at the University of Minnesota.

### ***Turkeys***

The major problems facing the turkey industry today are those associated with fecundity, health, leg problems, least-cost feeding and management. Basic and applied research, as well as, effective extension programs are being conducted. They have emphasized problems associated with fecundity, feeding and management. Continuous funding for the program has been received from the Minnesota Turkey Association.

Leadership by the scientists in these areas is positively recognized in Minnesota and nationally. Much of the current knowledge about the recognition of broody turkey hens, broody hen treatment and endocrine events associated with broody hens can be tracked to these researchers in the Department of Animal Science. Some specific requirements relative to turkey feeding, lighting, and the management of other environmental factors, have had a major positive impact on profitability in the turkey industry. There are only a small number of decision-makers in the turkey industry. The faculty members working with turkeys in the department appear to be on a first name basis with the key decision-makers in Minnesota. The work planned for turkey endocrine research and applied management studies appears realistic.

The review team questions the wisdom of the department making a substantial investment to facilitate complex metabolic studies involving environmental chambers that may be used by a senior faculty member for only a few years. This is an important area of research, therefore alternatives for data collection or research objectives in this area should be given careful study.

When the review team assessed the size of the turkey industry in Minnesota it concluded that 1.6 FTE's are inadequate to serve the State's research needs. Additional areas to consider for future research efforts include turkey immunology and turkey product technology.

### ***Dairy***

Dairy research is extremely important to Minnesota where receipts from milk and dairy cattle represent the largest single agricultural enterprise. The review team supports the research by the faculty members working in dairy production systems where emphasis is being given to the importance of profitable and sustainable dairying in Minnesota. Coordination of programs among the members of the dairy research group should be emphasized. The faculty members are encouraged to include representatives from Food Science in their research activities. Input from committee is important to maintain industry communications. The annual the Dairy Advisory Dairy Conference seems to provide a forum for linking resident and branch research staff with extension efforts. Although the total number of faculty members involved with dairy research is 13, the effective allocation of resources to resident dairy research is much less. For example, retirements and illness have reduced that number by two. In addition four others are at Branch Stations, two have no research appointments, and one is not on the graduate faculty. This leaves only four faculty members representing 1.38 FTE's for resident research. This appears inadequate given the size of the dairy industry in Minnesota.

Productivity of the dairy production systems research group has been good. Adequate publications have been produced and 12-14 graduate students are currently being advised by these faculty members. The addition of at least one more research/teaching faculty member with a dairy interest would have a large impact on meeting the needs of the industry in the state. Areas of expertise for the new individual could be basic research in physiology, animal behavior, food quality, or reproduction. Research should emphasize problems of the Minnesota dairy industry.

The dairy production group appears to have adequate cows and facilities especially for applied studies at the Branch Stations. The review team supports the suggested changes in programs that include concluding the crossbreeding and inbreeding work and reducing the emphasis on stray voltage problems.

The members of the Department of Animal Science involved in cooperative dairy research, especially outside the department, are encouraged to organize a strategic planning session to consolidate research projects into focused and manageable areas of individual interest. A few well developed areas of research could enable individuals of this group to successfully compete for larger and more coordinated grants and federal funding. This coordination could also build recognition for specific expertise at the University of Minnesota. In-depth investigations using state-of-the-art techniques within a single area may be preferable to diffuse efforts that often attempt to address all problem areas identified by the dairy industry.

The dairy production systems researchers are commended for the levels of funding obtained and for the aggressive recruitment of graduate students. The placement of these students in the dairy industry and other graduate programs indicates the high regard for the training provided by these researchers.

### ***Sheep***

The decreasing research efforts relative to sheep combined with the considerable interest in current programs presents a dilemma. The review team recommends that small ruminant programs continue although some restructuring is needed.

Several researchers in the department use sheep for their research studies, at least as a model for other ruminants. No additional small ruminant resident research faculty may be necessary, but the formation of an interest group to foster communications should be given careful consideration.

With the large number of sheep available at the Branch Stations, consideration should be given to having one person coordinate research programs at both Morris and Crookston. Consideration should be given to reducing the on-campus flock in size to a teaching flock.

Efforts to foster interactions with programs on small ruminants in the College of Veterinary Medicine should be encouraged.

A non-tenure track extension and teaching position could be used to cover small ruminant programs especially since small ruminants have been given considerable attention in recent years. This position may not necessarily be located on the St. Paul campus. Networking with other programs in neighboring

States such as Wisconsin and South Dakota and the use of research results from other institutions would be necessary to make this type of appointment a viable solution.

## **Teaching**

### **Undergraduate Education**

Currently the undergraduate enrollment in the Department of Animal Science is 128. The undergraduate students who met with members of the review team seem well satisfied and very positive about their experiences within the Department of Animal Science. Even though there have been recent revisions to the college programs, the students were comfortable with the definitions and requirements for the new majors. The students identify with the department and this allegiance is strengthened by involvement in student organizations and activities. They reported that faculty members and teaching assistants are available and approachable. The St. Paul campus was favored over the Minneapolis campus by students due to the friendly atmosphere and helpful attitude exhibited by the college administration and faculty members.

Recruitment efforts will need to address the negative image problems reported with regards to agricultural majors on and in the department. Counterbalancing the St. Paul campus image problem are the positive attributes of the educational experience and the job opportunities that are available.

Some concern was expressed about the fact that recent retirements included faculty members that had been heavily involved in teaching and undergraduate activities. When new individuals are hired, emphasis on undergraduate involvement should be considered in order to maintain the current positive attitude of students towards their undergraduate teachers.

The department is commended for its leadership role in redefining majors for the college. The efforts to concentrate on trained advisors is applauded and students seem well informed and comfortable with the advice. The lack of concern by students about these significant changes indicates the success of the educational efforts by the advisors. Periodic evaluation and redistribution of the advising loads may be necessary to insure the balance of disciplines and availability of basic and applied scientists as advisors. Advising loads of more than 25 undergraduates per faculty member should be discouraged. Such advising loads are likely to be difficult to maintain or may represent unusual burdens if continued indefinitely.

In view of the increased outreach responsibilities proposed by the reallocation exercise at the University and recent retirements in teaching faculty, the undergraduate curriculum will probably need careful re-evaluation. The large number of listed courses may profit from some re-evaluation to address the needs of changing career choices and student Profiles. Reduction in the number of courses, reorganization of material presented updating of course contents and alternative instruction methods including interactive media should be considered. For instance, Course number 3111, "Introduction to Animal Behavior" and Course number 3113, "Animal Welfare" might be combined into a single course that could satisfy both undergraduate curriculum needs and proposed outreach education efforts. Updating the course work to include new topics in international agriculture, biotechnology and social issues should be considered.

The department is to be lauded for making available the opportunities for undergraduate students to have hands-on experience through such activities as practicums and internships. Broadening the laboratory experiences in the initial levels of management courses should be considered as one option to address the diverse and more frequently urban backgrounds of students.

There are several positive aspects of the judging teams and evaluation courses. They encourage communication skills, facilitate identification with production animal species and increase interaction with the animal industry. The review team encourages a broadening of the types of experiences relative to animal evaluation. The number of courses offered in this area could be reduced. Experiences should not be limited to show ring appraisal, but rather augmented with classroom emphases on a variety of industry programs for evaluation and performance recording schemes. Students should have the experience of making various management, culling and breeding decisions. Students should be guided through

decision-making with emphasis on economic benefits and availability of information from a variety of sources.

### **Graduate Education**

The department's graduate teaching program involves approximately 70 students in several different graduate areas including animal genetics, biotechnology, ruminant nutrition, non-ruminant nutrition, reproductive physiology, and growth and muscle biology. Approximately 47 graduate students have majors in Animal Science; the remainder are enrolled in other graduate programs on campus. The latter, however, are supported and advised by graduate faculty in the Department of Animal Science.

There is considerable confusion concerning the exact number of graduate students involved in the department. The Graduate School administration indicated that there are currently a total of 36 Animal Science graduate students. The Department Graduate Studies chairman indicated there were 47 with another 23-25 graduate students who were in other graduate programs but being advised and funded by faculty members in the department. Thus, the College and the Graduate School administration need to work towards the development of an accounting system that would properly credit all non-Animal Science program students to the department for which the faculty are advising and providing funding.

In general, the graduate students appear to be of high quality, and indicate they are very favorably impressed with the graduate education that they are receiving. They were also very complimentary of the personal and advisory relationships that exist with the faculty as well as the working relationships that exist within the department. They were also complimentary of the support services available (library, statistical consulting, computer consulting, etc.) on the University of Minnesota campuses.

The number of foreign graduate student admissions in the department has risen significantly during the past two or three years. It is recommended that the ratio not be allowed to increase above the present level.

Several, possibly minor but important, concerns were expressed by the graduate students, including:

1. The lack of a formal departmental orientation program for new graduate students.
2. Until recently there was little contact between the Department Head and the graduate students. The recent implementation of a quarterly meeting with the Department Head is appreciated.
3. There is lack of participation in departmental functions and seminars by the graduate students in physiology and growth and muscle biology. Concern was expressed by students in other areas that these students, who are generally funded by departmental faculty, do not consider themselves to be part of the department.
4. Several graduate students expressed a strong need for the development of a departmental Graduate Student Association. The function of the association would be to develop social activities to help promote a departmental feeling among graduate students and to integrate new domestic and foreign students into the department. It would also provide a means of bringing together departmental students who are currently housed in the four buildings.
5. There was a lack of information about the "proposed merger" of the department with College of Veterinary Medicine, and how the merger might affect graduate students and their graduate programs.
6. It appeared that there was a lack of interactions between graduate students and the Minnesota animal industries.
7. Concern was expressed about the recruitment and interview process for prospective graduate students and faculty members. Several indicated that some faculty members may not make sufficient efforts to assure that candidates feel that they are wanted by the Department of Animal Science or the University.
8. With the recent losses of faculty, impending losses of faculty positions due to budget cuts, and several relatively near-term faculty retirements, concern was expressed about the

reduction of departmental teaching expertise and its effects on the undergraduate and graduate teaching programs.

9. Concern was expressed over the apparent lack of support for the department's seminar programs by both faculty members and especially graduate students in the physiology and growth and muscle biology areas.

The review team recommends that the faculty members seriously consider the following suggestions as possible means of improving the overall expertise of the graduate students in the department.

1. Develop a formal annual orientation program for graduate students. The orientation should provide the opportunity to meet all faculty members, graduate students, postdoctoral students and key support staff. A packet of materials about the department and its expectations should be provided.
2. Establish a departmental Graduate Student Association, with the commitment that all faculty members encourage each of their students to become involved in the activities of the association.
3. Develop a departmental seminar series organized by the faculty to include outside speakers. Faculty and graduate student participation would be expected.
4. Organize a set of discipline oriented seminars with the requirement that all graduate students present at least one discipline related seminar per year during their graduate career.
5. Encourage all faculty members with extension appointments to invite and encourage graduate students related to their species/discipline area to occasionally accompany them on industry trips and to participate in extension programs.

Following are a number of additional general concerns and suggestions by the review team about the department's graduate program.

1. It appears that the number of graduate students receiving all of their degrees at the University of Minnesota (i.e. undergraduate and graduate) is excessive. It is strongly recommended that the department aggressively seek more of their students from other universities, and that the faculty members attempt to place Minnesota students, interested in graduate study, at other universities.
2. It is recommended that all Ph.D. students be required to have at least one formal teaching experience during their graduate career. This should include actual lecture development and delivery, not just quiz and exam grading. Extension presentations including development and delivery could be considered for those desiring to pursue extension careers. Appropriate critique and feedback should be made concerning their presentations.
3. It appears in light of the recent and impending loss of faculty positions and the numerous graduate level courses that have low enrollment, that the faculty should conduct a complete review of the department's graduate instruction programs.
4. There is concern about the potential loss of a critical mass for conducting graduate programs in the area of animal genetics. The review team strongly suggests that the next faculty position be filled with a physiological/quantitative geneticist. This individual should be responsible for bridging the gap between quantitative genetics and the molecular biology. He/she should also be willing to cooperate extensively with some faculty members in physiology and/or nutrition and give emphasis to the genetic control of physiological and metabolic traits in food animal species. It is further suggested that the current quantitative genetics faculty members begin looking at potential collaborative efforts in this area.
5. It was the review team's understanding that the possibility of dropping the requirement for a written preliminary doctoral exam has been discussed. The review team suggests that the graduate faculty seriously consider this option and that the exam be replaced with a

- requirement to develop a formal grant proposal for one of the major funding agencies or private industry (e.g. USDA, NIH, Southeastern Poultry & Egg Association, etc.). The grant proposal should be critiqued by the student's graduate committee.
6. The review team questions the need to develop a full graduate program for Animal Production Systems. It is suggested that courses in this area be developed to provide a minor or graduate support program. It is further suggested that consideration of this matter be delayed until a decision is reached on the proposed merger with the College of Veterinary Medicine. If the merger does occur, then the relationship between the Animal Production Systems graduate program and the recently proposed Population Medicine program must be determined.

## **Extension**

The livestock industry in Minnesota makes an important contribution to the economy of the State. Nationally, Minnesota ranks fourth in milk production, seventh in red meat production, third in swine production, second in turkey production, ninth in cattle on feed and tenth in egg production. The \$3.3 billion farm gate cash receipts for the livestock industry is very important for the continued viability of rural communities in Minnesota. In order to maintain this viability, it is not only important to continue to improve the profitability of animal agriculture, but also address important issues such as environmental effects of management practices, food safety, animal welfare and sustainable animal production systems.

To address these issues and bring about the needed changes in the Minnesota livestock industry, a system of specialized agents among field staff, extension appointments at Branch Stations and specialists in academic departments has been developed by the department.

1. Specialized agents in livestock appear to be selecting a specific species for their area of emphasis. Additional in-service training by species is needed frequently (3 or 4 times per year) and must be provided by campus specialists. Even with increased in-service training the continual turnover of field staff will make it difficult to keep a highly trained field staff available to serve the industry properly without extensive support from specialists.
2. Program planning must be done jointly with specialized agents with priorities coming from these joint planning efforts.
3. A closer working relationship between specialists and specialized agents can be enhanced by involving specialists in the recruitment and selection of specialized agents. The area of specialization should be identified prior to recruiting the agent. Likewise, the department should include a specialized livestock agent on its search committee when hiring extension specialists.
4. While specialized agents can handle county meetings and farm visits, they should not be expected to meet the total needs within their cluster area. Specialists need to be on farms periodically. Their presence on farms accompanying the specialized agents provides an important learning aspect for specialists and an excellent in-service training for specialized agents.
5. Specialists should be complimented on their close working relationship with their respective livestock industries. Listening to the needs of the various animal industries is an important first step in successful programming.
6. Specialists are also commended on their willingness to use new delivery systems in a selected manner where appropriate. These can aid the efficiency and variety of technology transfer.

Extension programs conducted in Animal Science are traditional in many ways but innovative in others. While many traditional information presenting meetings are held, there appears to be a willingness to try new methods of delivery and to identify and solve problems important to the livestock industry.

Interdisciplinary programs between departments is better than normally found in Land-Grant institutions. The review team encourages increased use of the interdisciplinary systems approach. Specialists in the department must develop and implement programs on a livestock systems basis and serve as the key individuals for providing the systems approach to extension programming.

Programs presently consist of a series of activities and do not appear to be driven by the results that will be achieved. Future extension programming should be driven by goals and expected results. This will necessitate a planning process to identify the most appropriate needs for each industry group and to achieve the intended goals. Extension programs in the meat animal area should continue to serve the vital need of relating to consumer needs for meat products. The proposed beef extension program involves many programs to transfer technology and address issues of importance to the beef cattle industry. Decisions need to be made as to which programs are of the highest priority and then concentrate on those programs.

Some of the swine extension programs should be consolidated. Programs of varying depth and type are encouraged to meet the needs of different levels of producers. Specialists should be commended for using the correspondence course approach of programming.

Poultry programs are closely tied to the needs of the industry and appear to be well appreciated by producers. This program has minimal interaction with the specialized agents (as expected given the industry structure) and appears to be more focused than other commodity programs.

The dairy programs are directed toward important production technology areas. The inclusion of animal waste management and food safety programs is encouraged as is cooperation with specialists from other departments. The use of videotapes and dairy industry publications to transfer information should be increased. The dairy faculty members are encouraged to establish goals or targets based upon the desired changes in the Minnesota dairy industry and to institute programs to assist the industry to reach those targets.

The small ruminant program is quite extensive indicating that a real need exists in this area. This area has shown broad audience appeal across several species including sheep, red deer, goats, etc. Even though the economic impact of the individual industries may not be as large as that for other species, the extension program provides a meaningful response to a genuine need identified by these small industries. To achieve the goal of enhancing the profitability and viability of Minnesota livestock industry several needs were identified.

1. Current FTE's consist of 2.25 in beef, 4.95 in dairy, 2.1 in swine, 1.03 in chickens, 0.78 in turkeys, 0.88 in meats and 0.0 in sheep and small ruminants. The retrenchment of 1 FTE in dairy further reduces this area of expertise. For a state with a livestock industry the magnitude of that in Minnesota, it is important that further retrenchment not occur.
2. More programs need to be packaged around the major issues and priorities that are important to extension. When issues such as environmental concerns, food safety and animal welfare are to be addressed and linked to economical animal production systems, it is essential that animal scientists who understand the livestock production systems be directly involved in the research and education activities.
3. Adequate operational funds are essential if programs results are to be expected.
4. A small ruminant position in extension/teaching is needed to cover sheep, goats, llamas, red deer, etc.
5. An effort to address poultry products is needed in either animal science or food science and needs to be coordinated with the production specialists.
6. Funding needs to be provided for extension assistantships to assist in programming. This will help train graduate students in extension education and can provide well trained students for specialized agent positions.

7. 4-H/youth efforts are an important aspect for leadership development, career planning, linking science to agriculture and recruitment for the college. Objectives around the above areas need to be redefined and an emphasis placed in this area.
8. Specialists need to take advantage of sabbaticals as an effective method of professional improvement.
9. The specialists are commended on their efforts to provide multi-state programming and are encouraged to expand these efforts. Current collaborative programs in swine, dairy and turkey production are excellent examples of pooling expertise across various state staffs to conduct outstanding in-depth programs for top producers.