Department of Dairy Science at Virginia Tech
The Path Ahead

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Introduction

As we move toward the start of 2012, I am increasingly asked what I think the future holds for our department. Certainly, as I discuss below, we have some major issues looming. But we also have many, many aspects of department function and activity that continue to be tremendous successes. I care deeply about this department and I expect our future to be bright. My entire academic and professional career is embedded and interwoven in this department, the college of Agriculture and Life Sciences (CALS) and Virginia Tech. In short, I am invested. As a scientist, I seek to have my opinions driven my data and facts. So the primary purpose of this report is to share information about our department's recent history. This comes in part from preparation for a comprehensive departmental review that will occur in April of 2012. These departmental reviews are conducted periodically as a part of the USDA – NIFA oversight of agricultural experiment stations around the United States. For example, the departments of Food Science and Technology and Horticulture were reviewed during 2011.

As researchers and teachers we are frequently asked to predict future potential of undergraduate students as employees or as prospective graduate program candidates. This continues as we evaluate the potential of graduate students as scientists or teachers and of assistant professors to continue as academic professionals. Peer review of scientific papers or submitted grant proposals are also a constant part of scientific life. Our coming department review is an opportunity to share our record and our vision of the future, with a panel of external reviewers with expertise and experience. It is also an opportunity for validation (or rejection) of assumptions and beliefs we as faculty members hold about our department. Perhaps more important it is an opportunity for these external reviewers to reinforce this view with college administration. A core assumption of most reviews is that past performance is the clearest indicator of future performance. Good students are more likely to be solid performing employees; organized, energetic graduate students with good oral and written communications skills are more likely to be to succeed in industry or as scientists; and assistant professors that have mentored graduate students, pushed their students to publish and pursued external funding are most likely to become outstanding professors.

In the same way, I believe the record of performance of the department of dairy science very strongly justifies the investment in the department and program by the college, university, state of Virginia, and stakeholders that is necessary to replace dairy center facilities and functions that will be lost as a consequence of airport expansion,

research park growth and construction of a new 460 bypass / Southgate Drive interchange. Secondly, facilities alone do not make, build, or preserve a regional program of excellence. Investment in dairy science faculty at a minimum to replace faculty lost to retirement is also key to continuing our departmental trajectory of excellence. In the following, sections I provide data which support this belief. Likely a successful outcome will depend on a concerted effort of present and past faculty, alumni, stakeholders, and industry leaders to help ***tell and sell*** the story of this department.

Core Values and Basic Assumptions

Regardless, of economic and budget issues we seek to be true to our broad departmental mission.

To educate students, create and disseminate knowledge, and develop applications of technology through study of dairy and related biological systems.

To be successful in this mission we believe that we must have an exceptionally strong regional / national undergraduate program that is held in very high esteem. In short a program that attracts a diverse cohort of new students each year. We posit that success also depends on having a core of faculty members that are highly competent in their respective discipline areas. And faculty members who are engaged teachers willing to mentor these students in both the classroom and in extra-curricular professional activities. That we are currently successful in this endeavor is evidenced in the placement of our graduates, the multi-award winning activities of the Dairy Club, Dairy Challenge Team, Judging Teams and various youth programs. It is critical to remember that all of these activities take faculty time and effort. It is a convenient and often politically motivated ploy for some to focus on credit hours or number of classes alone as a proxy for faculty activity. As I witness daily, the success of our undergraduate program and academic mentoring depends on a multitude of 'hidden' and often unappreciated demands that are not reflected in a simple metric like credit hours or class numbers. As illustrated in a later section, as faculty members retire, if positions are not replaced it is rather self-evident that the capacity for all of the various demands will diminish. Figure 1 illustrates a key element to success of the undergraduate program, namely increasing demand.

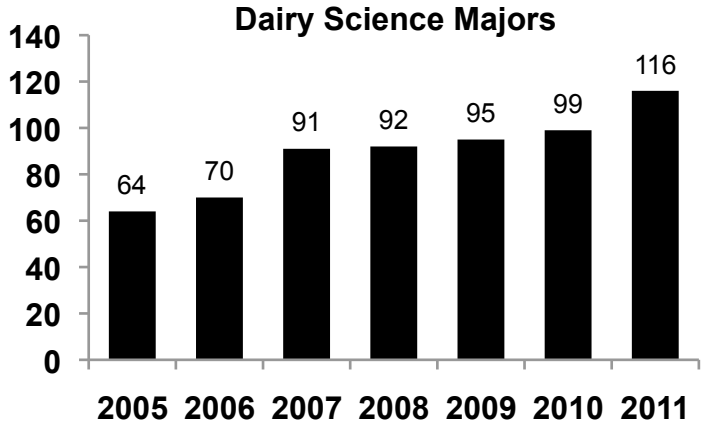
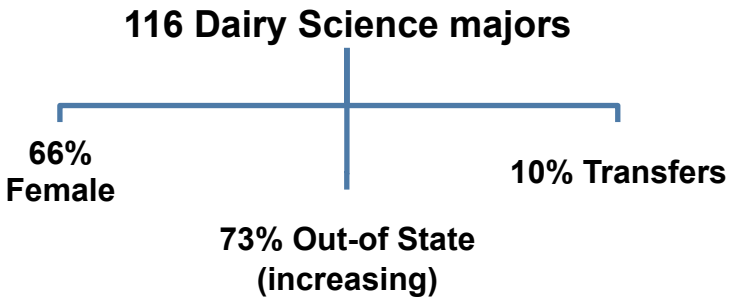


Figure 1. Dairy Science majors 2005 to 2011.

Diversity and broad appeal is a second element that is important and necessary if we are to maintain and grow in our status as a regional/national center of excellence in dairy science. There has been talk for some time about the need for consolidation of academic programs especially among the more specialized programs of the land-grant universities. The states colored in on the map represent the homes of our current undergraduate majors. More dairy science majors come from Virginia that any other single state but it is evident that we draw students from much of New England and the Mid-Atlantic. We anticipate opportunities to increasingly attract students from the mid-west and south. Regardless, as illustrated by the profile in Figure 2, the Virginia Tech department of Dairy Science **is now** a regional center for undergraduate dairy science education as evidenced by the fact that 73% of our undergraduate majors are non-state residents. This metric we believe is an excellent reflection of the perceived value of our program and something that deserves to be nurtured and supported. In this era of globalization in nearly all aspects of our lives and in the dairy industry generally, we view this enrollment trend as a very positive result.



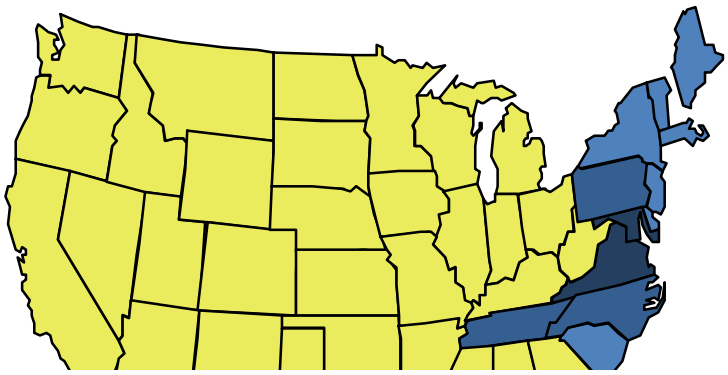


Figure 2. Undergraduate student profile and home state distribution of undergraduate student majors.

Scholarship and Scientific Reputation

In past reports I commented on the growing demand for all departments in the college to increase scholarship, external funding, and efficiency of programs. I am sometimes asked by parents or others why scholarship matters. First, it is important to remember that Virginia Tech is a tier one research university. It has a primary institutional mission for discovery and dissemination of new knowledge. In this regard, every academic department at the university has a fundamental scholarship obligation. I am very proud that faculty members in the department of dairy science take this effort very seriously. This is how departments build and maintain excellent scientific reputations. High scientific regard and reputation attract outstanding graduate students and fellow scientists (both from other VT departments and colleges and other universities) with a desire for collaboration. Excellent scientists attract resources to their programs. Superb researchers bring energy and credibility to the classroom that is difficult to achieve in institutions without professors that are also active scientists. There is the added opportunity for students with the desire to work on independent studies and undergraduate research problems. These can be life-changing experiences that are not available at all institutions of higher education. It is also worth emphasizing that we are the Department of Dairy Science not Dairy Husbandry. This is not to say that we do not offer many hands-on activities but it does say the emphasis is understanding, managing, and analysis.

Also related to reputation is the fact that **four** current or recently retired faculty members are **Fellows** of the American Dairy Science Association. This is the single highest recognition bestowed on members of the society and is restricted to only a very small percentage of the entire membership. Furthermore faculty members have received **15 national awards** for Research, Teaching or Extension excellence between 2005 and 2010, including three awards in 2010. Excellent reputations are built slowly. I believe our current faculty is cut from similar cloth and given the opportunity they will expand the reputation of the department in all of its missions. This of course depends on an appropriate level of facilities and staffing support from the college and university.

Figure 3 provides probably the single most important measurement of scholarship success in an academic setting among the 'hard sciences', namely the publication of refereed peer reviewed scientific journal articles. It is important to appreciate what this really means, scientific journal articles are not simply published as would be articles submitted to a newspaper or magazine i.e. some proof reading and editorial correction. Scientific journal articles are reviewed by journal editors then sent to other scientists who review, critique and pass judgment on the experimental design, statistical analysis, presentation, and interpretation of the data presented in the manuscript. As an example, the Journal of Dairy Science, which is one of about 50 agricultural journals, has been ranked in the top 1 to 3 among all of such journals for the past 10 years. The Journal of Dairy Science has approximately a 40% rejection rate of for submitted manuscripts. In 2010 dairy science faculty members published 12 papers in the Journal of Dairy Science. Certainly department faculty members also routinely publish in many other broader audience journals also with excellent ratings. This depends on the nature of the research and the most appropriate audience. The second classification illustrated is for scientific abstracts. There are the brief reports that accompany scientific presentations made at professional meetings. I include these because they are most often presentations made by graduate students, postdocs or occasionally undergraduate researchers. These I think are important because they promote both the student and reputation of the faculty member's program which again is important in reputation building. In summary, from 2005 to 2010 Dairy Science faculty members have published **153** refereed scientific journal articles (average of 25.5 per year). In addition, they have published a total of 58 refereed conference proceedings, 9 book chapters, 1 book, 231 scientific abstracts and 198 popular press articles. During this same period of time there were 17 Ph.D. dissertations and 23 MS theses completed by Dairy Science graduate students mentored by Dairy Science faculty members. This is excellent scholarly productivity, especially given what has happened to the number of faculty members on staff during this same time period.

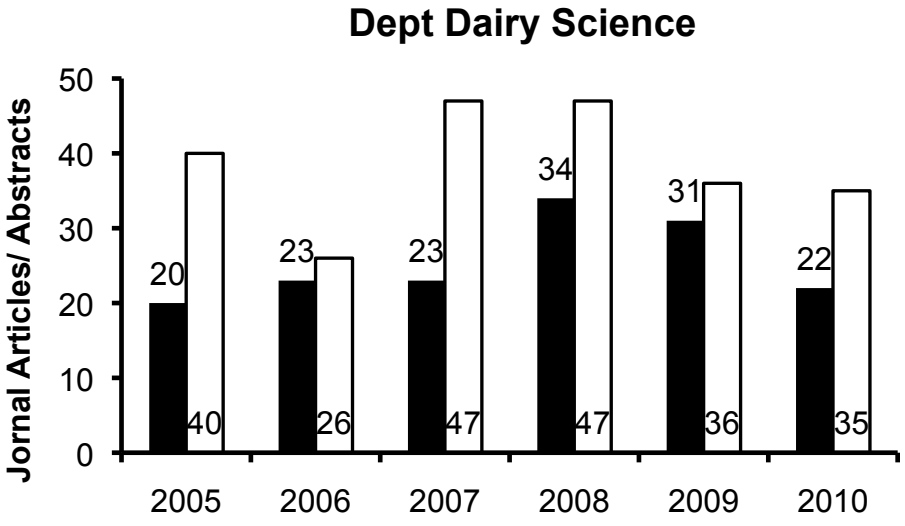


Figure 3. Publications summary by year for department of Dairy Science. Solid bars indicated the number of refereed scientific articles and open bars scientific abstracts.

Experiments are expensive. While the Dairy Center facilities supported by the college and university are indeed essential and appreciated to provide animals for various teaching activities and research trials, the majority of the expenses linked to completion of individual research trials are supported by external funds. Nonetheless, a brief discussion of Dairy Center expenses and revenues is relevant. First, after much discussion over the past several years, it is now clear to college administration that better utilization of the facilities is in the best interest of both departmental programs and the college. Specifically, during the past several months we have finally reached full capacity of the free-stall barn for lactating cows i.e. 242 lactating cows. This is relevant because as an economist would suggest, this does a much better job of spreading more productive units (lactating cows) over the largely fixed costs of facilities and labor. Certainly having more lactating cows does increase feed and animal care expenses but as long as milk and cull cow revenues offset the increased input this is a healthy, desirable situation. It is instructive that several years ago (2006/2007 budget cycle), we were forced to respond to a college/university/state demand to cut the operations budget by reducing feed and culling cows. From a dairy stand point this was very counterproductive decision that has taken to the current time to rectify.

Labor costs in an institutional setting are also problematic, in comparison with a private enterprise. By chance many of our outstanding dairy center employees are also long-term employees. Consequently, because of their performance and time in grade, salaries and fringe benefit costs are likely higher than average. There are also clear rules regarding earning of annual leave days, sick leave and hours worked per week that impact labor costs. Because many of these employees are likely to retire over the next 1-2 years, even if replaced labor costs will go down. Given the current economic and political climate, it seems likely that an even greater proportion of future labor needs will be handled by student and part-time, wage employees. Regardless, because of the current milk price, we anticipate that revenue from the sale of milk and cull cows that goes to the college coffers will more than offset both operations expenses and labor expenses for the current budget cycle.

External Funding

In an earlier newsletter, I referenced the movie Jerry McGuire and the catch phrase “Show me the Money”, as crass as this may seem to some readers, it is nonetheless a fact that neither individual academic departments nor Virginia Tech for that matter can achieve the greatness they desire or even complete their primary missions without substantial external funding. Increasing tuition and fees are an issue but as an example the Commonwealth of Virginia has consistently failed to support student instruction even at the level of funding indicated by their own state guidelines. A very recent issue of the Chronicle of Higher Education (Nov 4th, 2011) listed in state and out of state tuition and fees for colleges and universities for each state. For Virginia Tech costs were $10,509 and $24,480 for in state and out of state, respectively. I compiled a listing of what I would consider peer institutions. For these schools average and median values were $10,307 and $9,665 for in state and $25,678 and $25,509 for

out of state tuition and fees, respectively. For the sake of comparison a sampling of private colleges and universities averaged $34,677 and a median value of $38,327 with no differential for in state vs. out of state. This in part explains the priority that the department places on finding scholarship assistance for our students i.e. witness the effort and corresponding success of the Hokie Cow Classic golf tournament fundraiser which will soon celebrate its 10 anniversary.

Many of you are aware, that Virginia Tech just completed a development campaign that raised more than 1 billion dollars in endowment support. This speaks volumes about the individuals, corporations, and successful alumni that care deeply about the university. Departmental alumni and friends have also generously supported a variety of departmental programs. It is my belief that positive decisions on construction of replacement facilities and actual start of construction will also offer additional endowment possibilities specific for dairy science. The other major element of external funding involves competition for grants and contracts primarily to support research. Since 2005 departmental funding has increased dramatically. Figure 4 shows the total value of grants and contracts and proportion assigned to department faculty members. Increasingly more and more federal agency grants are multi-investigator, multi-year, and often multi-institutional. This again speaks to the reputation and value that scientific colleagues place on Dairy Science faculty. It is evident that there has been a tremendous increase in the value of grants and contracts as well as the number of projects. In particular, it is telling that proportion assigned to Dairy Science faculty has increased from $550,000 in 2005 to $4,890,000 in 2010.

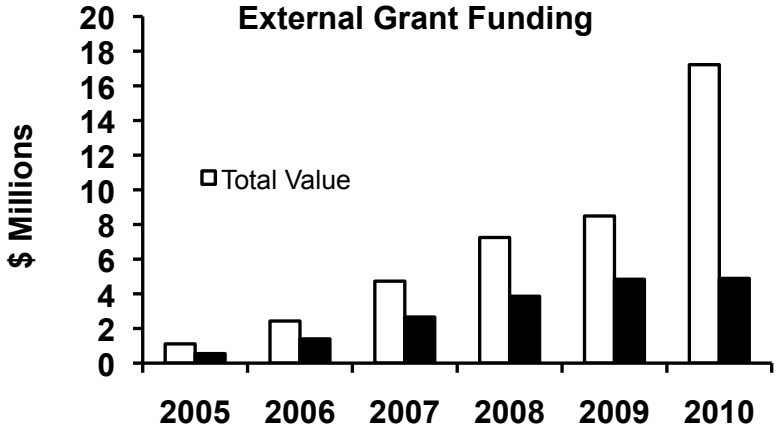


Figure 4. Dollar value of active grants and contracts.

Faculty Staffing

The outcome of the most recent wave of faculty retirements means that by the end of 2011 we will have gone from 14 tenure track faculty members in 2006/2007 to 7 faculty members. We have greatly benefited from the part-time efforts of several

retirees related to teaching needs but these commitments are winding down. The data shown in Figure 5 illustrate changes in tenure track faculty both on a total (left panel) and on a mission area FTE basis (right panel). Briefly, in CALS tenure track faculty member percent effort is classified into parts of three mission areas: teaching, research or extension. This division is a reflection of both how the individual is paid as well as primary work function expectations. For example, the proportion of salary assigned to teaching is paid from the so-called 208 general fund account. These are funds that are primarily derived from tuition and fees and an increasingly smaller proportion from state support. Salaries for research or extension appointments are derived from the 229 fund account which pays for functions of the Ag Experiment Station and Extension. These funds are derived from a combination of federal, state, and local sources. Paradoxically, virtually all other VT tenure track faculty members in other colleges are paid from the 208 general funds despite the fact that these individuals also have performance expectations for research / scholarship and outreach. Two things are evident in these graphs. First the overall loss of faculty members and secondly, the loss of relative balance in FTE assignment across the three mission areas i.e. 4.14/7.0 = 59.2 % of faculty FTE time nominally geared to the research mission as of January 2012.

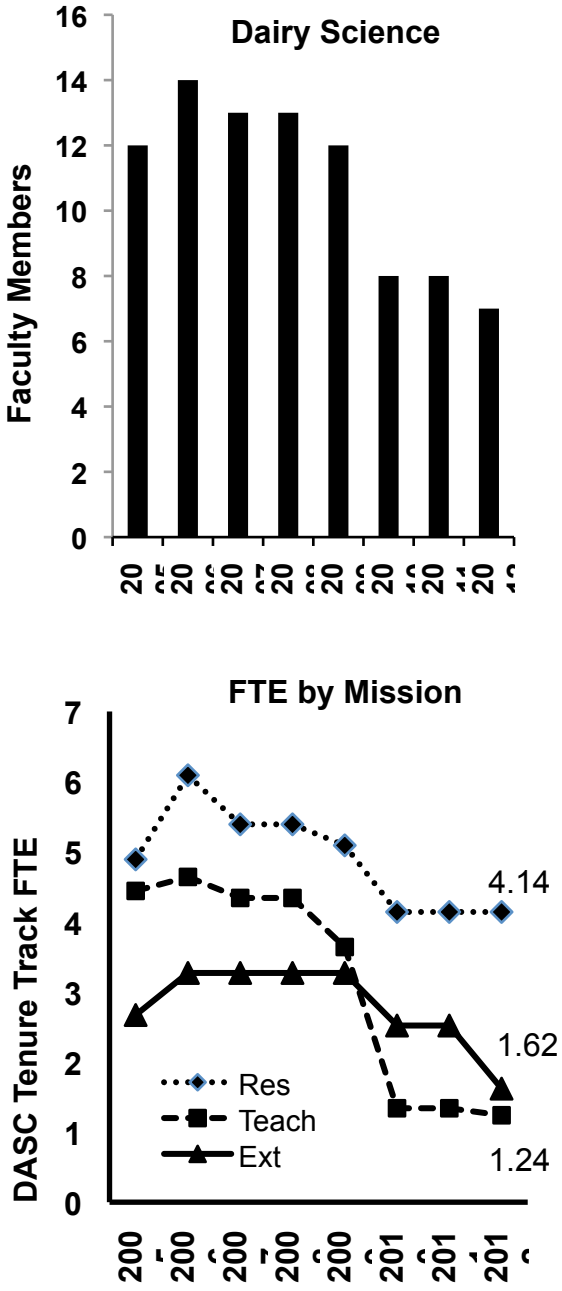


Figure 5. Dairy science tenure track faculty (left) and faculty assignment by mission (right).

While it is certainly true that mission assignment does not necessarily reflect faculty activity on a short-term basis, primary mission focus is nonetheless a part of negotiation and hiring contracts of individual faculty members. For example, someone

who accepts employment with an 80% research appointment is clearly expected to focus their primary efforts in research. In December of **2010** I submitted a hiring plan which included 4 faculty positions. Our plan was combined into a comprehensive document submitted from the college to the provost but to my knowledge it has not gained traction centrally. However, at the same time there have been multiple faculty and administrative searches and hires both across CALS and the university broadly over the past several years. Only a little searching will provide evidence of tremendous growth in creation and expansion of research efforts across the university. There is a seemingly alphabet soup of institutes/centers and initiatives – Fralin Life Science Institute; Institute of Creative, Arts and Technology; Institute for Critical Technology and Applied Science; Institute for Society, Culture, and Environment; Virginia Bioinformatics Institute; Virginia Tech Carillion Research Institute; and Virginia Tech Transportation Institute. My impression is that there are also frequent announcements for the hiring of multiple university employees involved in a variety of oversight, compliance, and general administrative functions as well as shifting of current faculty members to take on such duties. It is rather evident that if faculty members are shifted into these duties or if hiring for these duties dilutes the resources for hiring 'front line' faculty members that there are fewer individuals to serve in the primary mission areas.

I certainly am in support of the growth of CALS and the university but I expect our department to be a vital part of this growth as well. At the present time (November 2011) there are **9** active faculty searches in CALS but none of these are in Dairy Science. Indeed, since 2006 there have been **85** faculty hires or searches for an average of 7.1 ± 3.6 per department. Dairy Science has had 2 hires (Drs. Christina-Petersson Wolfe and Isis Mullarky both in 2006). The data shown in Figure 6 demonstrate dramatic differences between CALS departments regarding faculty hiring (arrow indicates dairy science). The data do not include 4 instructors that were hired during this time i.e. 2 each in APSC and HNFE.

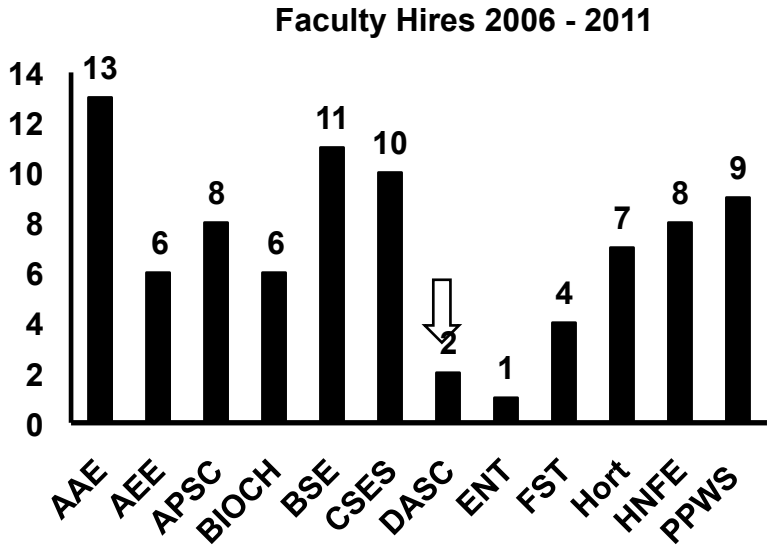


Figure 6. Summary of faculty hires and active searches in CALS by department.

It is evident to me that our faculty, graduate students, and undergraduates have performed very well as measured by multiple metrics. We are excited to continue the trajectory of excellence we have been on for the past several years. During the past three years we have toiled to create a strategic plan that builds on past success and allows us to fulfill our broad department mission in the best way possible. I am convinced that a department like ours should be a fundamental part of the College of Agriculture and Life Sciences at Virginia Tech. Staffing and facilities are key elements necessary for the success of any academic program. Until these fundamental issues are addressed, it is exceeding difficult to complete any meaningful strategic planning at the department level.

Issues and Concerns

It is no mystery that the protracted process involving the construction of a new dairy at the Kentland farm has been trying. However, the planning process with the engineering and architectural firm has been excellent. When all of the planned facilities are constructed, I believe we all will be very pleased with the result and more important that we will be poised to expand on our position as a premier dairy science program. It is essential to understand that relocation construction requires replacement of all dairy center activities and functions. This is not simply replacing a free-stall barn and parlor. The plan includes four primary elements: (1) facilities for lactating cows, heifers and calves at the Kentland location, (2) a barn facility for intensive animal research also at Kentland, (3) teaching facilities near the Alphin Stuart arena and (4) reproduction

facilities at the Moore Farm. Detailed planning and construction of the facilities for lactating cows, heifers, and calves is estimated to cost ~ $12.8M. It is anticipated that the Governor's proposed budget for the 2012/2014 cycle will include funding for a new classroom building on campus. This is apparently VT's first construction priority for this budget cycle. The governor releases his proposed budget about December, 17th, 2011. If the budget announcement is as anticipated, I have been told we should expect that $12.8 M in VT funds will be made available to begin the detailed design and construction of facilities at Kentland. CALS administration is also expecting the announcement to include a clear and direct plan for funding and construction of the other three elements. The estimated cost of all of the elements is ~ $21.2M. There is also some prediction that the pace to expand the airport and build the new highway interchange may occur more slowly that initially expected. This practically means that some activities may be allowed to continue at the current Dairy Center location for some period of time. Regardless, detailed planning and construction of the remaining elements is critical for the continuing function of research, teaching, and extension programs in Dairy Science, Veterinary Medicine, and the Ag Tech program. It also has to be considered that estimated costs are more than likely to increase if the delay between planning and actual construction is dramatically greater that initially thought.

As I have indicated before, I am by nature optimistic. It is my sincere believe that our department has performed well and that we will be in a position to thrive in the future. It seems to me that it would be in the interest of CALS to nurture successful programs and to act to give us the tools so we can all succeed together.