Opportunities for collaboration between Universities and AIPL

Remarks prepared for the 100th Anniversary of the
Animal Improvement Programs Laboratory
October 28, 2008

Bennet Cassell, Extension Dairy Scientist, Genetics and Management, Virginia Tech

The most fundamental requirement for universities and AIPL to cooperate is the assumption that quantitative geneticists continue to exist at the Universities. Those with dairy interests are already unique and the likelihood of an increase in supply has seemed remote indeed in recent years.

I would encourage AIPL, and indeed everyone with the chance to do so, to speak loudly, clearly, and often to University administrators, those deciding the direction of future hires, of the demand for quantitative research in dairy cattle breeding that has resulted from dense SNP arrays. No cooperation in genomics or any other area will be possible if university faculty do not include individuals with the interest and skill set needed to apply this technological breakthrough. As one of a very rare breed of Extension Specialists in dairy cattle breeding, I would argue that this new knowledge will require appropriate spokesmen and spokeswomen to get the knowledge out and help keep the phenotypes coming.

Genome data have revitalized animal breeding. In recent years, one view of this discipline was that nothing new had been learned in 50 years. The situation today is that very little is known about the behavior or utility of a fundamentally new kind of information. What is increasingly clear is that, to reach its fullest potential, genomic data must be integrated into an existing body of knowledge and experience about changing the genetics of populations. The modern dairy cow is the product of the successful application of quantitative genetic principals. Genomic data are a powerful addition to, rather than a replacement for, one of the most successful areas of scientific agriculture.

Polygenic inheritance is alive and well in dairy cattle breeding on the 100th anniversary of the Animal Improvement Programs Laboratory. Hopefully, our Universities will recognize this fact before an entire discipline area in animal science disappears.

The reality of life in research at an American University today is that overhead dollars drive the long term planning process. Research that is expensive (and fundable) generates more overhead dollars and is therefore more desirable than research that is less expensive (and fundable). Research that is not fundable has no value, regardless of possible scientific merit. And any fundable research that does not generate overhead dollars will ultimately find itself either unattractive to prominent scientists or taking a backseat to the high-overhead projects that such scientists also conduct.

What does this have to do with AIPL, who has generously shared research dollars, data, ideas, and interpretation with me and others like me through the years? If the population geneticists at the Universities can't generate a bit of overhead as they fund their research and other activities, they are going to disappear, replaced by researchers in other areas who do. That's sad, but that's life in a University today. The cooperative agreements that I'm familiar with show overhead-type dollars contributed by both parties as "contributions in

kind." ARS will pay the salaries of its scientists to cooperate with scientists at my University who are paid from money from – where? I'm afraid that the public part of public universities is disappearing. So far, Virginia Tech doesn't turn down cooperative agreements with ARS for lack of overhead dollars, at least in my experience. But does Virginia Tech want to invest in my tenure-track replacement if that scientist only attracts grants without overhead? I'm getting more nervous about the answer to that question every year.

Areas for cooperation:

1. **Phenotypes are vital**. AIPL can work with Universities to standardize collection of unique phenotypes and serve as the central collection point for building data sets of sufficient size for meaningful genomic studies. University research herds have served this role in the past, but they are under increased budget scrutiny and really aren't large enough to generate useful data in a reasonable time period. I see research efforts that **involve cooperator herds and joint extension/research projects** as a means to preserve, even strengthen, dairy breeding research. Expertise at the local university enables this process. It won't happen from Beltsville, because personal relationships with herd owners are essential to the process. Cooperative projects can lead to good extension, much better research, and preservation of a useful discipline area in higher education.

2. **AIPL has new opportunity that really did not exist until very recently: to help train existing and future animal breeders at Universities in genomic methods**. These ideas must be shared with bright young people who populate undergraduate and graduate student populations. They must be shared throughout the dairy industry in appropriate detail. Today, such expertise is at an absolute premium. Workshops, perhaps internships, and development of software that can be used to teach and analyze genomic data seem like logical areas for cooperation. Such a responsibility, at least on the scale required, would break new ground for ARS administrative personnel. It will require resources of the most expensive kind, qualified people.

3. **Make new friends, but keep the old.** Some of AIPL's very best work through the past 100 years has been to communicate the value of measuring performance of animals to management of profitable herds. We have a collective opportunity to preserve and improve data collection systems. Universities that train students for roles in production agriculture need to at least expose those students to the value of performance records. For some, the seed will germinate, as it did with so many of those here today. So – genomics are great, but preserve the reports of changes in population size, structure, and performance, genetic trends, inbreeding. I consider the AIPL web site the most valuable single watering hole on the information highway.

4. **There will be lots of interest from Universities in genome-related research, as these projects will certainly attract interest from the new Agriculture and Food Research Initiative.** Joint research efforts advance the mission of AIPL and Universities. I equate AIPL with data, with excellent cooperation, and with the expertise and input into research ideas that results in implementation of what is learned. Where will the genomes come from? Right now, degrees of freedom are running $250 apiece,

so they aren't likely to find their way into the public domain as easily as a test day milk weight. Can we find a way to learn what needs to be learned without using almost all of the available research dollars on the process of identifying the genotypes?

Final thoughts:

There is value to improving the utility of animals without explaining all the biochemical and physiological processes involved. Perhaps the most important joint role of Universities and AIPL will be to maintain an honest and rigorous interest in SOME research that finds application in the near term. To do so, the research must be of high quality, directed towards realistically defined objectives, and carried to a stage of completion where conclusions can be drawn and steps taken towards application. It is easy to utter the inevitable caveat "More research is needed." More research will always be needed. But funding streams must also ultimately bear fruit for those who provided the funds – which aren't the review boards or administrators or the researchers absorbed in their own highly focused programs - but the taxpayers.

So, it's an honor to say "Happy Birthday, AIPL." I'm glad you are still with us after 100 years! The very existence of the Animal Improvement Programs Laboratory strengthens the case for continued improvement of production livestock through genetic means. AIPL-University collaboration is an opportunity to solve problems and expand knowledge. In the process, a discipline area of immense value to production agriculture will be sustained and strengthened.

Audience discussion

Summarized by S.M. Hubbard, AIPL

- Federal program for animal breeding projects on genomics
- More direct involvement of ARS with university graduate programs