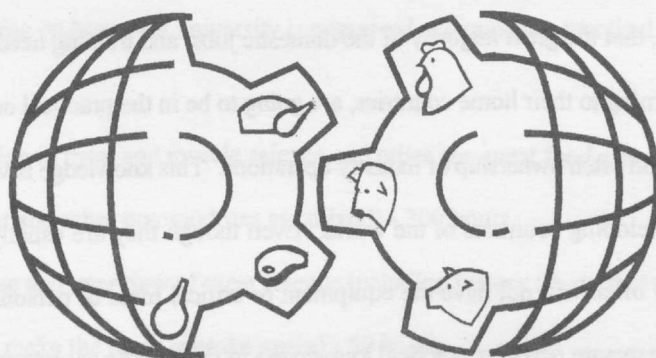


Session 8

Teaching and research in meat science and technology

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Focusing on practical knowledge of meat science and technology

by

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Meat science has always been a broad field requiring expertise in Anatomy, Meat Cutting, Biology, Biochemistry, Physics, Engineering, Refrigeration, Microbiology, Statistics, Economics, and Business Management. Like all science in the last few years, there has been an explosion in the food safety and microstructure and function of cells. These exciting new areas have caused us "old-timers" to struggle to keep up with the new knowledge, and new people entering the field must face the dilemma of where to start their knowledge base. The quantity of information available today, plus the additional information that will be discovered in the working life span of teachers and researchers, makes the task of knowing it all very difficult. If you are an expert in only part of this expanding information, it will be essential that you "team up" with other individuals that are experts in your areas of deficiency. With changing job opportunities and organizational barriers, this will prove to be very difficult.

Thus the problem boils down to the old struggle between practical information that will yield results that are useful today and basic information that will result in information that might be useful in the future. This problem has always frustrated scientists and university programs.

Since my younger students and sometimes co-workers now classify me as an "old timer" (even though I resist the label), I guess it is now my turn to philosophize. The fortunate thing is that if you follow my philosophy as I have done with others, you like I, will have forgotten where it originated.

It is obvious, at least to me, that the great majority of the domestic jobs, and training needed for international students from developing countries who are returning to their home countries, are going to be in the practical or technology area. Hopefully, this training will lead to management, and often ownership of industry operations. This knowledge is very essential and often overlooked for international students from developing countries of the world. Even though they are usually excellent in obtaining and very interested in basic knowledge they often will not have the equipment or critical mass of personal and in most cases the need for extensive basic knowledge but a desperate need for practical knowledge in their home environment. Here, I would assume, there is little argument that practical training is essential for a great majority of domestic students and international students that will return home. Coupled with a brief overview of the new technology but not attempting to become an expert in this new development is also

almost essential. It would also be helpful if these students know which basic areas might prove useful in the near future.

The professor falls into two categories depending on what he/she is going to teach. If he/she is going to teach students following the practical area, then again, the direction of training should be the same, as the students needs.

The tough decision comes in training the few that will be engaged as university and research personnel that will specialize in basic research and teaching. These persons, of course, will need to be trained in these basic areas, so the real question to be answered is, should they also be trained in the practical (applied) areas? The obvious answer here is yes, but the problem now becomes, how much can one person absorb and keep up-to-date with? Not many will have the time to be an expert in both, so just as I supported the practical people having an overview in the basic area, I would also suggest the basic people have an overview of the practical area.

This will be a little more difficult since many of the basic people do not start their education in the food area but often come from a basic science discipline, and also, because the basic area is more glamorous and a lot are impatient -- particularly starting their education in a less glamorous area. Also, if you are going to stay in the basic area all of your life, and your goal is only to solve the mysteries of science, then the question might be, why waste time in the practical area? Unfortunately most of us don't know where our careers are going and how our interests may change, where funding opportunities may lead our programs, so the basic individual needs an expertise in the basic area and at least an understanding in the practical area.

1. While in high school (grades 1 through 12) should have work experience in a butcher shop and/or meat department in a supermarket (cutting meat, learning anatomy, learning price relationships, observing difference in tenderness and methods of cooking) - 2000 hours.
2. College education, majoring in meat science, food technology or veterinary medicine (concentrating on public health).

A four year program depending on how your university is organized and pursuing practical meat knowledge in:

- A. Heavy concentration in meat and muscle science and other non-meat food areas (becoming more important as meat and other commodities are mixed) - 300 hours.
- B. Introduction course and overview of meat science including history (those that don't understand history are apt to make the same mistake again) - 50 hours.
- C. Slaughter and fabrication of meat animals (you don't have to be an expert but you must understand these areas to manage them) - 100 hours.
- D. Introduction to anatomy - 50 hours. (More needed if # 1 is not completed)
- E. Sausage manufacturing - 50 hours.
- F. Introduction to biochemistry -- particularly classes pertinent to muscle function and post-mortem

reactions - 50 hours.

- G. Introduction to microbiology (both spoilage and pathogens) pertaining to food - 100 hours.
- H. Introduction to agricultural statistics, particularly analysis of variance, correlation and regression, and least cost formulation - 50 hours.
- I. Introduction to meat and food inspection including HACCP - 50 hours.
- J. Introduction to meat grading and university meat judging team experience - 100 hours.
- K. Introduction to domestic as well as world meat marketing - 50 hours, and if possible, study abroad experience - 150 hours.
- L. Meat analysis (chemical, physical and micro) class covering the theory as well as procedures in typical meat type analysis.

This should include standard methods as well as more rapid techniques - 100 hours.

- M. Advanced meat science and technology class stressing biochemistry, microbiology, additives and temperature influences pertaining to meat - 50 hours.
- N. Introduction to computer science. Computer literacy is going to be a necessity in all fields - 150 hours.
- O. Seminars in meat science which stresses new developments in meat science - 50 hours.

2. Graduate level classes (some taken by undergraduates)

- A. More "in-depth" study in biochemistry, microbiology, computer science, and statistics as pertaining to meat - 200 hours.
- B. Muscle substructure and its relationship to contraction, protein separation, and theory of how the muscle functions in the live animal as well as post mortem - 50 hours.
- C. Sensory evaluation - 50 hours.
- D. Research experimental design - 50 hours.
- E. Instrumental analysis pertinent to meat - 100 hours.
- F. Electron microscope as well as other observation techniques useful in studying structure - 100 hours.
- G. Gene manipulation and its potential in the meat area from both a research and practical standpoint - 50 hours.
- H. Thermo processing (30 hours) and packaging of meat - 30 hours.
- I. Research projects at both the M.S. and Ph.D. level. It would be desirable if the projects were in different areas.

Different schools, even in different countries, would be useful. Time depends on project.

- J. Animal by-product processing and product utilization - 50 hours.
- K. Diseases that can be transmitted by meat animals - 50 hours.
- L. Seminars:

1) Seminars for domestic and international students in the meat area and new developments in meat science - 50 hours; and

2) Seminar for practicing English and answering unexpected questions for international students and some domestic students - 50 hours.

M. Exposure to other food disciplines in addition to meat - 200 hours.

3. Visiting scholar after some work experience.

Update of knowledge or change in direction or interest. 6 months to 1 year should be repeated every 5 to 10 years.

I realize I have unloaded the whole wagon and this is the center of the problem. If I have to lean in one direction then it would have to be toward the practical area. Such things as post-mortem biochemistry, anatomy, chemistry and physics of muscle as well as additives, microbiology, and statistics related to meat are almost indispensable in both the practical and basic training.

All of these then are coupled with the individual's specialty.

Good luck in obtaining, remembering and keeping "up-to-date" with it all!!