

TRENDS IN RESOURCE ALLOCATION AND MEAT RESEARCH PROFILE AT U.S. PUBLIC INSTITUTIONS

Larry R. Miller

United States Department of Agriculture, Cooperative State Research, Education, and Extension Service, Washington, DC 20250, USA

Key Words: Meat Research, National Funding Trends, Funding Profile, Resource Allocation**Background**

Research related to meat science in the United States has dramatically changed over the past several decades as has the resource allocation profile. During the early stages of meat research, the Committee on Cooperative Research was formed in 1924 by scientists from the meat industry, the United States Department of Agriculture (USDA) and Land Grant universities ^{1/}. The Purnell Act, passed by the U.S. Congress in 1925, provided some of the first public funds for investigations to address meat quality and palatability issues ^{1/}. The Reciprocal Meat Conference was created in 1947 to facilitate the exchange of ideas among researchers and educators. Concurrently, regional (multi-state) research was authorized in USDA in 1946 to fund cooperative research important to multiple states and to avoid duplication of research efforts. In the 1950's, meat science emerged as a distinct discipline and research focused on carcass composition, tenderness, meat curing, and phenotype/carcass yield relationships. Research efforts in the 1960's were directed toward the effects of composition, distribution, and quantity of lipids, the regulation of adipose accretion, and meat quality. A significant change occurred in the 1970's where growing emphasis was placed on basic research and responses to nutritional concerns by the public. Funding support for research increased during this period and the number of graduate students associated with meat research grew rapidly. During this decade, meat scientists interfaced with numerous other fields of science including biochemistry, physiology, endocrinology, microbiology, neurology, biophysics, and histology.

Objectives

Analyze resource allocation for public meat research in the U.S. and characterize the portfolio of meat research investments.

Methods

Trends in the amount of public resources provided for meat research (beef, pork, lamb, and poultry) were analyzed for fiscal years 1980, 1985, 1990, 1995, and 1997 and a more in-depth analysis was conducted for fiscal year 1998 data to characterize the profile of the research portfolio. The source of the data for both analyzes was the Current Research Information System (CRIS), ^{2/} a national database maintained by the USDA, Cooperative State Research, Education, and Extension Service (CSREES) which contains information on public agricultural research conducted by USDA agencies, primarily the Agricultural Research Service (ARS), and U.S. universities (mainly Land Grant institutions). To compare changes in research investments over the two decades, expenditures were adjusted for changes in prices using the 1982-1984 Consumer Price Index (CPI) Bureau of Labor Statistics base. A computer search strategy was developed to identify unique combinations of CRIS classification codes to apportion resources from 1980 to 1997 research projects to three mutually exclusive categories: 1) meat quality, 2) food safety, and 3) product development and processing. Data for 1998 were derived from a computer search based on the combination of key words and CRIS classifications codes to avoid duplication and cluster research projects. Each of the 388 research projects selected from the 1998 data were subsequently manually reviewed and assigned a percentage to four mutually exclusive categories: 1) meat quality, 2) food safety, 3) product development and processing, and 4) marketing. Funding (\$ millions) and the number of scientist year equivalents (SYs) associated with each data point were aggregated to represent the measures of research investment.

Results and Discussion

The total public investments in meat research (Table 1) increased modestly (30%) when adjusted for inflation, although actual funding increased 154% from 1980 to 1997 (\$27.1M to \$68.8M). Funding for meat quality research decreased slightly (12%) when adjusted for inflation. The most dramatic increase in funding (120%) occurred for food safety research, most subsequent to 1990, increasing to 46.2% of all meat research by 1997, demonstrating the response to public concern about the safety of animal products. Federal sources provided the preponderance of funding increases for food safety research in recent years mostly because food safety is viewed as a national issue by the U.S. Congress rather than a geographic specific problem. Only slight increases in funding (16%) occurred for product development and processing research partially due to less emphasis given to that area of research at the federal level during that period. Between 1980 and 1997, more basic research was conducted with emphasis on cellular and molecular biology, diet and health issues and public concerns about emerging pathogens. Table 1 also displays the number of SYs associated with the funding levels. The overall number of SYs decreased from 221 in 1980 to 209 in 1997; however, the SYs committed to meat quality and product development and processing research decreased from 97 to 69 and 59 to 47, respectively. This is in contrast to the 65 to 93 increase in SYs for food safety research reflecting shifts in resource

ocation within the meat research domain. The average expenditure per SY (funding divided by SYs) increased from \$148,869 to \$205,263 between 1980 and 1997 when adjusted for inflation (\$122,624 to \$329,187 unadjusted) suggesting the cost of conducting research (e.g., costs instrumentation and supplies for more basic research) has increased at a rate greater than overall inflation as measured by the CPI.

Table 1

U.S. Public Investments by Meat Research Category 1980 to 1997

Year	Meat Quality			Food Safety			Products and Processing			Total		
	\$M	\$M	SYs	\$M	\$M	SYs	\$M	\$M	SYs	\$M	\$M	SYs
1980	16.3	(13.4)	97	9.0	(7.4)	65	7.6	(6.3)	59	32.9	(27.1)	221
1985	17.5	(18.8)	82	9.0	(9.7)	64	7.4	(8.0)	54	33.9	(36.4)	200
1990	16.1	(21.0)	88	10.5	(13.7)	62	7.0	(9.1)	40	33.6	(43.9)	190
1995	14.3	(21.8)	76	15.6	(23.7)	77	8.4	(12.8)	47	38.3	(58.3)	200
1997	14.3	(23.0)	69	19.8	(31.7)	93	8.8	(14.1)	47	42.9	(68.8)	209

Data were adjusted by the Consumer Price Index (Base Period 1982 - 1984 = 100).

Unadjusted data are shown in parenthesis.

Table 2

Source of Meat Research Funding 1998

Funding Source	\$(M)	Percent
USDA-ARS	25.1	38.6
USDA-CSREES	6.5	10.0
Other Federal Agencies	3.0	4.6
State Appropriations	21.4	32.9
Private	9.0	13.8
TOTAL	65.0	100.0

Actual funding (Data were not adjusted by the Consumer Price Index).

Four attributes of the 1998 meat research profile were analyzed: percentage of investments by research category, geographic distribution of research, sources of public funding, and the diversity of scientific disciplines. Percentage funding for meat quality, food safety, product development/processing, and marketing was 30.6, 47.1, 18.3 and 4.0 respectively. The percentage allocation of SYs was very similar. Food safety continued to be the major component of the total meat research portfolio. Although, meat research is conducted in virtually every state, it is concentrated in the southern and north central regions of the nation where the majority of meat animals are produced and large Land Grant institutions and/or ARS laboratories are located. The distribution of funding in 1998 by geographic region was southern, 39.8%; north central, 29.0%; northeastern, 20.0%; and western, 11.2%.

The sources of funding (Table 2) for public research were federal, 53.2% (ARS, CSREES, and other federal agencies); state appropriations, 32.9%; and private, 13.8%. The federal contribution for meat research is higher than many other fields of agricultural research partly due to the national emphasis on food safety and concentrations of ARS research effort. The \$6.5M funding provided to universities by CSREES in 1998 was nearly equally divided between research grants and formula funding to states, \$3.1M and \$3.4M respectively. The magnitude of the diversity of scientific disciplines contributing to meat research was studied by analyzing the percentage assignment to fields of science for each 1998 research project. There were 30 different fields of science represented in the classification of the 388 projects. The most common fields of science were biochemistry and biophysics, bacteriology, and chemistry followed by nutrition and metabolism, microbiology (other than bacteriology), molecular biology, economics, and general biology. Of the 388 projects, 38% included multiple fields of science, illustrating the diversity of disciplines employed by meat researchers.

Conclusions

Meat research is a dynamic set of activities, changing dramatically over the past century through the interface with innumerable disciplines to confront issues important to the meat industry. Total funding for meat research increased only modestly when adjusted for inflation during the period of this study; however, notable changes occurred in the distribution of resources in the research portfolio. Resources (funding and SYs) allocated to meat quality and product development/processing research changed little when adjusted for inflation, whereas those for food safety increased considerably. The total number of scientists committed to meat research remained virtually unchanged during the period. Federal sources were the primary source of funding in 1998, a reflection of the national emphasis on food safety. Changes in research emphasis were influenced by factors including industry problems, public perceptions about food safety, research funding availability, and scientific advances in molecular biology and genetic manipulation.

References

1. American Meat Science Association. 1972. Twenty-Fifth Anniversary History: Reciprocal Meat Conference/American Meat Science Association, 1947-1972.
2. Current Research Information System, United States Department of Agriculture, Cooperative State Research, Education, and Extension Service.