

## Chapter 19

# Extension Grain Science

## Contents

In the Beginning .....	91	Grain Science Subject Matter—1960's-80's.....	94
Formula Feed Growth—1950's .....	91	Grain Science Materials .....	95
Pilot Program, KSU—1959.....	91	Grain Science Publications .....	95
Project Objectives—1959 .....	91	Grain Science Newsletters .....	95
Extension Specialists Begin Project—1959-60 .....	92	Grain Science Books.....	96
National Advisory Committee—1960.....	92	Grain Science Audio Visuals .....	96
Feed Plant Feasibility Workshop—1961 .....	92	Grain Science & Industry Committees .....	96
Three Regional Workshops—1962 .....	92	Technical Consultations.....	96
Formula Feed Program—1962.....	92	Special Grain Science Display Unit .....	97
Major Grain Science and Industry Programs .....	93	Grain Science Scholarships .....	97
Feed Mill Operations Workshops—1963.....	93	Extension Grain Science Faculty Summaries .....	97
Grain Grading Schools—1968-88 .....	93	Extension Specialists—1988.....	97
District 4-H Wheat Shows—1968-88.....	93	Personnel in Extension Grain Science.....	Ch 6: 55
Feed Manufacturing Short Course—1972.....	93		
Grain Marketing Tours—1972 .....	94		
Computer Programs—1976-88 .....	94		
Grain Elevator Safety Meetings—1978 .....	94		
County Extension Agent Seminar—1987 .....	94		

*The information that follows focuses on only a portion of the educational activities and programs in Extension Grain Science and Industry at Kansas State University. It should not be viewed as a totally comprehensive review.*

## In the Beginning

*Editor's Note: The early Extension work related to Grain Science (prior to 1962) started as activities in Agricultural Economics. For continuity and clarity of understanding, comments about this early work are carried both in this chapter, and in Volume III, Chapter 1, Extension Agricultural Economics.*

### Formula Feed Growth—1950's

During the 1950's animal agriculture began to change. The formula feed industry began to grow rapidly. At the same time, the Federal Extension Service began to look toward the future.

As one 1962 KSU Extension Publication explained:

The Agricultural Extension Service is taking on new meaning and direction as it seeks to meet the challenge of a fast moving and ever changing agriculture. Past Extension educational programs have traditionally been directed toward improving agricultural production and product quality.

Now, however, the scope of Extension has been broadened to include many other facets of the American economy and more specifically, all phases of marketing.

Because of the growing interrelation of agriculture, business, and government, and the increased demands for services by agricultural supply, it is only natural that Extension move into these areas.

### Pilot Program, KSU—1959

In 1959, Kansas State University was selected as one of three universities in the United States to work with the new agribusiness approach. K-State was specifically selected to work with formula feed processing firms.

The work began under a three-year contract sponsored by the U.S. Department of Agriculture, "Marketing and Utilization Educational Demonstration Work with Formula Feed Processing Firms." K-State was selected because of work already underway in the area of feed technology.

In 1951, at the urging of the feed industry, the college had instituted a feed technology curriculum. Assistance from industry had made possible the construction of a feed manufacturing plant and other laboratories to be used in the curriculum.

By the late 1960's Kansas State University granted degrees in milling science and management, feed science and management, and baking science and management.

### Project Objectives—1959

The formula feed industry was growing rapidly. In Kansas alone between 1960 and 1964 about 80 custom feed mills were built.

The specific objectives of the project were to plan and conduct a pilot educational program designed to assist personnel in the formula feed industry in the adoption and use of the latest feed formulation techniques, manufacturing processes and techniques, marketing methods, and modern management tools.

#### **Extension Specialists Begin Project—1959-60**

Two faculty members were hired to work on the contract—a Project Leader, Robert Schoeff, and a Feed Manufacturing Specialist, Richard Baker.

#### **National Advisory Committee—1960**

A National Educational Advisory Committee of outstanding industry and academic leaders was appointed by Extension Director Harold Jones to advise KSU on the project.

#### **Feed Plant Feasibility Workshop—1961**

One of the first workshops carried out by the pilot Extension project was a "Feed Plant Feasibility Workshop" conducted October 2-3, 1961 at Kansas State University. The two-day industry meeting dealt with the "why" and "how" of long range planning for grain and feed firms.

#### **Three Regional Workshops—1962**

Three regional workshops were held in June, 1962, on developing an Extension program for the formula feed industry to carry out the last phase of the project.

One was held in Manhattan, Kansas, June 4-5; the next at the University of Georgia in Athens, June 19-20; and the last at the University of Delaware, Newark, June 28-29.

The first regional feed workshop was conducted at KSU, attended by 26 Extension Specialists representing 18 states, 12 representatives of the formula feed industry, along with ten members of the KSU flour and feed milling faculties and Extension Specialists, Robert Schoeff and Richard Baker.

The Georgia workshop was attended by 18 people, primarily Extension personnel from nine states. Also in attendance was Oakley Ray, director of market research for the American Feed Manufacturers Association in Chicago.

Guests included representatives of the University of Georgia and the vice president of the Georgia Feed Association.

The last of the regional workshops was held in Newark, Delaware. It was attended by 20 people representing eight states and the District of Columbia.

Unlike the other workshops, only three participants in this workshop were Extension Specialists. Others were university professors, representatives of government, and personnel from industry organizations. Special guests at this workshop were primarily faculty from the University of Delaware.

Initial reaction to the concept of a formula feed Extension unit was positive, and Bob Schoeff hoped at one point that as many as a dozen states would inaugurate similar feed extension programs within the next year. However, this did not take place.

In 1972 and 1973 a second effort was made to get other Midwestern states to expand their Extension programs into this area by having KSU Extension Specialists serve as consultants.

The program was designed to be self supporting, and a cooperative effort between each State Extension Service and grain and feed associations.

When no interest was shown in this proposal, several states associations asked Kansas State University Extension Grain Science Specialists Schoeff, Balding, and Wilcox, to work directly with them. This was done in Minnesota, Iowa, Ohio, Colorado, and Illinois with great success.

The Extension staff filled many requests for talks at state and national feed and grain conventions, nutrition conferences and safety programs throughout the U.S. and Canada.

#### **Formula Feed Program—1962**

When the USDA project concluded in 1962, the new Formula Feed Extension Program was established, financed jointly by the state and the Federal Extension Service.

This was a unique program not found in any other Cooperative Extension Service. Robert Schoeff and Richard Baker were asked to stay on as faculty for the new program.

In 1962 the book, *Silent Spring*, by Rachel Carson, was published. The book opened a new era where Americans began to question what the chemicals they were using were doing to the environment. With the book came an awareness of the potential dangers of pesticides and feed additives.

The KSU Extension Service responded in 1965 by adding a new position, Quality Control Specialist (Pesticidal Safety), Extension Formula Feeds.

This position focused on the use of animal drugs that were being added to livestock feeds and the need for feeders and feed manufacturers to comply

with the Food and Drug Regulations that pertained to these drugs. The position was filled by Robert Wilcox on July 1, 1965.

Three Extension Specialists in marketing, manufacturing and quality control carried on the program

from 1965 until 1988.

With Wilcox's retirement in 1988, the quality control position was discontinued. Several part-time appointments made to broaden the program to serve the milling and baking industries.

## Major Grain Science and Industry Programs

Overall, the purpose of the formula feed program remained remarkably similar to that of the original project through the years.

### Feed Mill Operations Workshops—1963

The primary objective of these workshops was to provide new and useful information to feed manufacturers and custom mixers. This would assist them in improving their operations by being more efficient, and through improved quality control help them produce a better product for their customers.

Information presented at these workshops was selected to provide employees and managers with the latest in feed manufacturing technology, government regulations, marketing practices and safety.

Beginning in 1963, a series of two consecutive evening meetings were held so feed mill employees would not have to miss work. There was excellent attendance and considerable enthusiasm for this new and unique extension program.

In 1968, the workshops were scheduled for one evening only, held in 12 locations around the State of Kansas. Jim Balding and Bob Wilcox did the planning, scheduling and presentations for these workshops. It became an annual event with an average annual attendance of 395 people from 128 firms.

### Grain Grading Schools—1968-88

Bob Schoeff assumed responsibility in 1968 for one of the oldest Extension programs, the Grain Grading Schools, formerly conducted by faculty in Agricultural Extension Economics. The one-day schools were held annually at eight locations across the state during March.

The schools were conducted by a team of 6 to 10 people. Federal Grain Inspection Service personnel handled the lectures, supported by personnel from the Kansas Grain Inspection Department, the Kansas Cooperative Extension Service, the Kansas Grain and Feed Association, and the Wheat Quality Council.

A major objective was to teach all elevator managers and employees the official U.S. grain grades and how to recognize major grain damage factors. A second objective was to keep managers and employees informed about new technological developments in grain grading and marketing.

A high turnover rate for grain elevator employees, along with periodic changes in grain standards, made these schools a needed annual affair. The average annual attendance was 348 people.

### District 4-H Wheat Shows—1968-88

From 1968-1988, Bob Schoeff was program coordinator for two 4-H District Wheat Shows annually. Conducted in cooperation with the State 4-H Office, the Kansas Wheat Quality Council, the Kansas Wheat Commission, and industry, the shows promoted the recognition of wheat quality and understanding of the U.S. grain marketing system.

The 4-H participants submitted two samples of wheat from the crop they grew. One was a sample taken from the combine for mill-bake evaluation of the wheat variety and the second was a hand-picked physical sample that was judged on its kernel uniformity, color and cleanliness.

A cash award program was developed with industry support for each district wheat show. The Grain Science & Industry Extension Specialist arranged and helped conduct an all expense paid four-day tour to Houston, Texas, for state 4-H Wheat winners and their County Extension Agents.

### Feed Manufacturing Short Course—1972

Extension staff in cooperation with the American Feed Association played a leading role in 1972 in initiating a special three week short course on feed manufacturing technology for middle management personnel from the feed industry.

It was designed to provide a broad understanding of the basic theories and concepts of feed manufacturing and new technology within the industry.

The course, which was taught in alternate years, was a university-industry cooperative effort. Lectures and laboratory sessions were presented by KSU resident faculty, Extension Specialists, and industry experts.

Attendance at the ten short courses, which were limited to 48 people, totaled 477. They came from 44 different states, 28 foreign countries and 239 feed and allied firms.

### **Grain Marketing Tours—1972**

Starting in 1972, Grain Marketing Tours to Houston-Galveston, Texas, and New Orleans, Louisiana, were conducted for groups made up of County Extension Agents and grain marketing personnel, vocational agriculture and community college agricultural teachers, farmers and state legislators serving on agricultural committees.

The purpose of the tour was to provide an opportunity to see and learn about the U.S. grain marketing system and its functions, with emphasis on wheat quality being delivered to foreign buyers.

The tours were typically conducted in February and July. They allowed participants to follow the flow of grain from the country elevator and terminals to export facilities in Texas or Louisiana, and on to large bulk cargo ships for export.

### **Computer Programs—1976-88**

When the Texas Instrument TI-59 programmable calculator was developed with the capability to compute simple feed ration programs, Bob Wilcox took on the challenge of learning how to use it and write programs for farmers and livestock producers.

Several simple feed ration programs (Beef Feed, Pig Feed, Dairy, and Sheep) were developed on this calculator. Similar programs included "Bin Inventory," "Estimated Value of Feed Ingredients," "Cattle Feeder Worksheet," "Feeder Pig Worksheet, and "100-Day Calf Weights."

They were widely used by County Extension Agents and their cooperators. Later, as computers with more memory and capabilities became available, these programs were adapted to computers and expanded to be more useful.

New programs, WCLEAN and WHEATPRO, were developed to calculate the economics of cleaning wheat on the farm or at the elevator.

The computer programs were widely used throughout Kansas and neighboring states.

### **Grain Elevator Safety Meetings—1978**

A series of major grain dust explosions in the United States in 1977-78 brought national attention to hazards in the grain marketing industry, and led to its designation as a target industry by OSHA (Occupational Safety and Health Administration).

Kansas State University Grain Science and Industry Extension Specialists responded by conducting 51 safety meetings that included ten area meetings in 1978 for all grain elevator personnel. These were continued annually.

Cooperating in these annual meetings were the Kansas Grain & Feed Dealers Association, the Kansas Industrial Safety Department, and insurance company representatives.

Annual attendance ranged from 303 to 511, and averaged 440 participants for the five years from 1984-89, representing an average of 155 firms per year.

### **County Extension Agent Seminar—1987**

A new County Extension Agent training seminar on "Wheat Quality as it Relates to Milling and Baking Properties" was first offered in December, 1987, at the Department.

Instructors from the milling, baking, agronomy and International Grains Program (IGP) faculty were utilized along with the department's mill, bakery and laboratories for hands-on instruction.

### **Grain Science Subject Matter—1960's- 80's**

Feed mill operations workshop programs included:

- Quality Control.
- Feed Manufacturing.
- Maintenance.
- FDA (Food & Drug Administration) Regulations.
- Good Manufacturing Practices.
- Customer Relations.
- Marketing.
- Safety Molds.
- Mycotoxins.
- Liquid Feed Supplements.
- Grain Preservatives.
- Control of Molds and Insects in Stored Grain.
- Reduction of Drug Carryover in Feeds.
- Controlling Sulfonamide Residues in Market Swine.
- Sulfonamide Tests.

Mycotoxin Tests.

Using Weather Damaged Grains in Feeds.

Use of Light Test-Weight Grains in Feeds.

Proper Sampling of Ingredients and Feeds for Assays.

Computer Programs.

Mixer Testing.

Results from Mixer Tests.

State Feed Control Regulations and

Safe Use of Pesticides and Feed Additives In and Around the Feed Mill.

The grain marketing programs covered:

Grain Grades and Standards.

Legislative Updates.

Special Services Offered by the Kansas Grain Inspection Department.

How To Grade Grain.

History of Grain Grading and Marketing.

New Technology in Grain Grading and Marketing, such as Near Infrared Reflectants (NIR) for Protein and Hardness Testing for Wheat Classification.

Grain elevator safety meetings included:

Preventing Fires and Dust Explosions,

Emergency Planning,

Environmental Protection Agency (EPA) Regulations On Use of Fumigants,

Occupation Safety and Health Act (OSHA) Health Standards,

OSHA Safety Standards for Grain Handling Facilities, Falls, and Suffocation.

### Grain Science Materials

Grain Science and Industry Extension Specialists wrote Extension publications, popular articles for trade magazines, chapters in the American Feed Industry Association (AFIA) Feed Technology Handbook and papers for technical meetings.

### Grain Science Publications

1) **Formula Feed Statistics: A Critical Review**, Robert Schoeff.

2) **Checklist of FDA Regulations**, Robert Schoeff, Carl Stevens, Robert Wilcox and James Balding.

3) **Checklist of FDA Good Manufacturing Practice Regulations**, Robert Schoeff, Robert Wilcox and James Balding.

4) **Winning & Keeping Customers**, Robert Wilcox.

5) **Prevention of Fires & Dust Explosions**, Carl Stevens and Robert Schoeff.

6) **How to Sample Feedstuffs**, Robert Wilcox.

7) **Using Grain Preservatives**, Robert Wilcox.

8) **Spoiled Feedstuffs**, Robert Wilcox.

9) **Kansas Feed Sales Tonnage**, Robert Schoeff.

10) **Liquid Feed Supplements**, Robert Wilcox.

11) **Feed Manufacturing Problems, Drug Carry over Control and Prevention**, Robert Wilcox and James Balding.

12) **Feed Manufacturing Problems, Incomplete Mixing and Segregation**, Robert Wilcox and James Balding.

13) **Safety Hazards to Feed Truck Delivery at Customer Locations**, James Balding.

14) **Feed Mixing Times and Feed Mixers**, Robert Wilcox.

15) **Preharvest Reminders on Safety for Grain Elevators and Feed Mills**, James Balding and Robert Schoeff.

16) **Preharvest Reminders on Maintenance for Grain Elevators and Feed Mills**, James Balding and Robert Schoeff.

17) **Residue Avoidance Program**, Robert Wilcox and others.

18) **Procedures for Hand Sieving**, Robert Schoeff.

19) **Damage Leaflets - Wheat**, Robert Schoeff and R. E. (Gus) Page.

20) **Damage Leaflets - Corn**, Robert Schoeff and R. E. (Gus) Page.

21) **Damage Leaflets - Sorghum**, Robert Schoeff and R. E. (Gus) Page.

22) **Damage Leaflets - Soybeans**, Robert Schoeff and R. E. (Gus) Page.

23) **Damage Leaflets - Oats**, Robert Schoeff and R. E. (Gus) Page.

24) **Sick Wheat**, Norman Whitehair, Hugh McDonald, Frederick and Robert Wilcox.

25) **Emergency Plan Notebook**, Robert Schoeff.

26) **Stored Grain Management**, Harner, Randall Higgins, Robert Schoeff, and others.

27) **Safety in Grain Elevators**, Robert Schoeff, and others.

28) **Historical Facts about Grain Marketing**, Robert Schoeff.

29) **RAP Feed Handling Systems**, Robert Wilcox.

30) **RAP Feed Mixing Systems**, Robert Wilcox.

### Grain Science Newsletters

November 7, 1962 marked the first publication of the Feed Reporter, which became the Grain Science Extension's monthly newsletter for feed manufacturers and grain marketing firms throughout Kansas.

Robert Wilcox was the editor from 1966 to 1988.

The purpose of the newsletter was to inform and educate management and employees on new ideas and research on feed production, grain storage, marketing and management, new publications, coming events, and other items that would assist them to better serve their customers.

In January of 1989 the name of the newsletter Feed Reporter was discontinued and replaced by Grain Science News for Agribusiness.

### Grain Science Books

- 1) **Feed Production School Handbook**, 1961, Chapter 1, Robert Schoeff.
- 2) **Feed Production School Handbook**, 1962, Chairman, Editorial Committee, Robert Schoeff.
- 3) **Feed Manufacturing Technology**, 1970, Chapter 1, Robert Schoeff; Chapter 4, Robert Schoeff; Chapter 16, Robert Wilcox.
- 4) **Feedstuffs Reference Issue**, Two sections- 1975- 1988 (13 annual issues), Robert Wilcox.
- 5) **Feed Manufacturing Technology**, 1976, Chapter 1, Robert Schoeff; Chapter 4, Robert Schoeff; Chapter 10; Robert Wilcox, Chapter 15, James Balding.
- 6) **Feed Manufacturing Technology**, 1985, Chapters 1 and 4, Robert Schoeff; Chapters 24 and 41, Robert Wilcox; and Chapter 61, James Balding.
- 7) **Feed Additive Compendium**, 1967-1988 (20 annual issues) Robert Wilcox contributions included Mixing Tests, A Test for Batch Mixers, Moldy Grain and Foodstuffs, and GMP for Premixes.
- 8) **(American Feed Industry Association) AFIA Truck Management**, 1983, Sub-Chapter 7, "Safety Hazards to Feed Truck Delivery At Customer Locations, James Balding.
- 9) **Kansas Beef Feeders Manual** - Mycotoxins - Robert Wilcox.
- 10) **Pork Industry Handbook** - PIH-86, Management To Prevent Residues in Pork - Robert Wilcox.
- 11) **Pork Industry Handbook** - PIH-94 - Calibrating Meter-Type Feed Mills, Robert Wilcox.
- 12) **Hoffman-Taff Research Reports #82** - Statistical Approach To Quality Control of Feed Additives, Robert Wilcox.
- 13) **Hoffman-Taff Research Reports #94** - Salt Tracers As a Means of Measuring Mixing Uniformity, Robert Wilcox.
- 14) **Hoffman-Taff Research Reports #96** - Mycotoxins, Robert Wilcox.

### Grain Science Audio Visuals

Slide-Tape Sets:

- 1) "Dept. of Flour & Feed Milling Industries," Robert Schoeff.
- 2) "Wheat From Field to Market," Robert Schoeff.
- 3) "Wheat Science," 4-H Project - Sheila Gains and Robert Schoeff.
- 4) "Safety Is Up To You," Carl Stevens
- 5) "Preventing Dust Explosions and Fires in Feed Mills," James Balding.
- 6) "Dust Explosions in Grain Elevators," 1976 & 1978, Robert Schoeff.
- 7) "Truck Safety," American Feed Industry Association, James Balding.
- 8) "Sulfonamide Residue Control," Robert Wilcox and USDA FSIS.
- 9) "New Employee Safety Indoctrination," American Feed Industry Association, James Balding.

Films:

- 1) "Deadly Dust," 16 mm color - Robert Schoeff.

### Grain Science & Industry Committees:

Department of Grain Science & Industry faculty served on numerous industry committees that included:

- n The American Feed Industry Association's Economic & Market Research Committee, Robert Schoeff, 1959 to date (December 31, 1988).
- n The American Feed Industry Association's Safety Committee, James Balding, 1974 to date (December 31, 1988).
- n The National Fire Protection Association's Technical Committee on Agricultural Dusts, James Balding, 1981 to date (December 31, 1988).
- n The American Association of Feed Control Officials Antibiotic Task Force, Robert Wilcox, 1983-1988.
- n The American Feed Manufacturers Association - Quality Control Committee, Robert Wilcox, 1966-1988.

### Technical Consultations

Starting in 1970 the Extension faculty in Grain Science and Industry provided technical assistance to various U.S. trade associations and foreign governments on feed and grain marketing, feed manufacturing, warehousing, safety, transportation, and quality control.

Robert Schoeff and James Balding worked with the U.S. Feed Grains Council, U.S. Wheat Associates, and the American Soybean Association on International Grain Programs (IGP).

## Special Grain Science Display Unit

A commercial display unit was obtained in the 1960's and educational and student recruitment material was displayed at many trade shows, conventions, university conferences and open houses from that time. Some of the major events were:

- n Midwest Feed Production School.
- n American Feed Industry Association's Feed Industry Show and Convention.
- n Bakery Engineers National Trade Show.
- n Kansas Grain & Feed Association's Convention.
- n National FFA (Future Farmers of America) Convention.

- n Association of Operative Millers Technical Conference
- n Kansas Formula Feed Conference.
- n KSU's Ag. Science Day and Open House.

## Grain Science Scholarships

In 1961 Dr. Shellenberger, Head of the Department of Flour and Feed Milling Industries, asked Dr. Schoeff to coordinate the Department's scholarship program with the Kansas State University Office of Aids and Awards and industry donors.

This was done until 1976 when faculty in each curriculum were assigned responsibility for scholarships on a direct basis.

## Extension Grain Science Faculty Summaries

Richard Baker. In 1959, Richard Baker was hired as the first Extension Manufacturing Specialist, Formula Feeds. He worked on the USDA contract as a specialist in the Department of Extension Economics. He went to Ralston Purina in 1962.

Robert Schoeff. In May of 1960, Robert Schoeff was hired as an Extension Economist, Marketing and Utilization of Formula Feeds.

He came to KSU from Central Soya Company/McMillen Feed Mills, Ft. Wayne, Indiana, where he had been director of marketing research for the six previous years. He also had two years of experience as a Farm Management Extension Specialist at Purdue University.

In 1964, Schoeff's title was changed to Extension Marketing Specialist, Formula Feeds. The assignment of Section Leader was added in 1965.

From January 1 to June 30, 1968, Schoeff was a consultant to ERS-USDA for a special study of formula feed statistics.

Carl Stevens. In 1964, Carl Stevens was hired as Extension Economist, Formula Feeds (to replace Richard Baker). He filled the position until 1965, when he resigned to join International Milling Company.

James Balding. James Balding became Stevens' replacement in March, 1965. He came to KSU from Hales and Hunter Company in Sanford, North Carolina, where he had been a plant manager. This title was later changed to Extension Specialist, Formula Feeds Manufacturing.

Robert Wilcox. Robert Wilcox joined the faculty in July, 1965 in the new position of Quality Control Specialist, Extension Formula Feeds (Pesticidal Safety).

He came to Kansas State University from Standard Chemical Manufacturing Company, Omaha, Nebraska, where he was director of nutrition. He also had two years of experience as Director of Nutrition for GTA Feeds, Sioux Falls, South Dakota.

## Extension Specialists—1988

In 1988, assignments to the Grain Science Industry Extension Program were:

Robert Schoeff, Extension State Leader and Marketing Specialist.

James Balding (.9), Formula Feeds Manufacturing.

Joseph Ponte, Jr. (.1), Baking.

Steve Curran (.1) Flour milling.

John Pedersen (.2), Sanitation/ Grain Storage/ Processing.

Robert Pudden (.3), Flour Milling/Baking.

*Contributing Author. The primary contributing author to this summary of the Cooperative Extension Service educational programs and activities in Grain Science and Industry, from 1965 through 1988, was Robert W. Schoeff, Ext. State Leader, Grain Science.*

**A complete list of personnel involved in Extension Grain Science and Industry is included in Volume I, Chapter 6, Extension Personnel, p. 55.**