

Approved February 13, 1992
Date

MINUTES OF THE SENATE COMMITTEE ON AGRICULTURE

The meeting was called to order by Sen. Don Montgomery at
Chairperson

10:00 a.m./~~8:30~~ on February 6, 1992 in room 423-S of the Capitol.

All members were present except:

Senators McClure and Brady

Committee staff present:

Raney Gilliland, Legislative Research
Shirley Higgins, Committee Secretary

Conferees appearing before the committee:

Dr. Walter R. Woods, Director of the Cooperative Extension Service, K-State
Dr. Richard D. Wootton, Associate Director of Extension, K-State
Dr. Don Cress, Food Science, K-State
Pat Murphy, Acting Assistant Director of Agriculture and Natural Sciences, K-State
Dr. Randall A. Higgins, Department of Entomology, K-State
Dr. Marc A. Johnson, Department of Agricultural Economics, K-State

A report by the Kansas State Cooperative Extension Service was begun by Dr. Walter R. Woods, Director of the Cooperative Extension Service. (Attachment 1). He introduced others who would be reporting: Dr. Richard D. Wootton, Associate Director of Extension; Dr. Don Cress, for the Department of Food Science; Pat Murphy, Acting Assistant Director of Agriculture and Natural Sciences; Dr. Randall A. Higgins, Department of Entomology; and Dr. Marc A. Johnson, Department of Agricultural Economics.

Dr. Wootton continued the presentation with his overview on the extension programs. (Attachment 1-8).

Dr. Don Cress followed with a report on food safety, filling in for Karen Penner who was unable to attend. (Attachment 1-10).

Next to report was Pat Murphy, for Dr. Homer Caley, on livestock protection. (Attachment 1-12).

Dr. Randall Higgins followed with his report on crop protection. (Attachment 1-13).

Final report was given by Dr. Marc Johnson on the state of the Kansas agricultural economy. (Attachment 2).

Dr. Woods summarized with a few concluding remarks regarding the funding of the extension service which he said is tied to research efforts. His department is endeavoring to increase communication of its evaluation of the safety of products and programs.

Sen. Daniels questioned Dr. Johnson as to the economic impact, with regard to taxation of the land, of farm losses due to the lack of moisture for irrigation. Dr. Johnson replied that taxes seldom respond quickly to loss of production of land. He noted that farm financial roots have been shaken in the '80s and for some poor financial conditions still persist.

Sen. Daniels asked Dr. Cress what message the Extension Service is giving with regard to radiation of fruit. Dr. Cress had no specific information on this but offered to further check for Sen. Daniels. Dr. Woods said that the Extension Service's stance on this is that it is a safe and effective way of preservation, however, they acknowledge that radiation is not favorably perceived by the public.

CONTINUATION SHEET

MINUTES OF THE SENATE COMMITTEE ON AGRICULTURE,
room 423-S, Statehouse, at 10:00 ~~a.m.~~ p.m. on February 6, 1992

The minutes of February 5 were approved.

The meeting was adjourned at 10:58 a.m.



Food Safety and Livestock and Crop Protection

A Report to the

Kansas Legislature

**By the
Kansas Cooperative Extension Service
Kansas State University**

*Senate Agriculture
2/6/92
Attachment 1*



Cooperative Extension Service

Office of the Director
Umberger Hall
Manhattan, Kansas 66506-3403
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February 6, 1992

To Members of the Kansas Legislature

Dear Friends:

This report addresses three related issues--Food Safety and Livestock and Crop Protection.

Extension's strength lies in its ability to identify and redirect resources to emerging issues to help Kansans prepare for economic and social change. These programs provide effective support for producers, consumers, and families, and for important segments of food service, marketing, and processing industries.

To improve the quality of life and economic well-being of Kansans of all ages and walks of life, Extension programs are issue driven, organized by specialist teams, and targeted to relevant need. Although not cited in this report, Cooperative Extension is addressing a number of critical educational issues including:

- * Agricultural Sustainability and Profitability
- * Food Safety and Quality
- * Rural Revitalization
- * Water Quality
- * Conservation of Natural Resources
- * Solid Waste Management
- * Youth at Risk

We invite your comments and suggestions on these or any other Extension program.

Sincerely,

Walter R. Woods
Director

TABLE OF CONTENTS

EXECUTIVE SUMMARY	1
OVERVIEW	4
DIRECTIONS FOR THE 90'S	5
FOOD SAFETY	7
LIVESTOCK PROTECTION	9
CROP PROTECTION	10
FOOD SAFETY EDUCATIONAL PROGRAMS	12
Food Service Safety	12
Consumer Awareness Programs	12
Food Safety Support Groups	13
Safety in Marketing and Processing	14
Home Food Safety	16
Post-Harvest Technology	17
LIVESTOCK PROTECTION EDUCATIONAL PROGRAMS	18
Health and Quality Management	18
Veterinary Medicine	19
Economic Factors	20
Facilities Management	20
Animal Damage Control	21
CROP PROTECTION EDUCATIONAL PROGRAMS	22
Crop Management	22
Soil Management	23
Forestry	23
Horticulture	24
Weed Control	24
Insect Control	25
Controlling Disease	27
Crop Protection Economics	29
Computer Software	30
Controlling Harvest Losses	30
Coping with Pest Infestations	31



EXECUTIVE SUMMARY

Cooperative Extension organizes educational programs in food safety for producers, consumers, and families, as well as food service, marketing, and processing industries.

FOOD SAFETY

Health risks from microorganisms, primarily bacteria, are the most likely cause of food safety hazards. Educational packets on food health risks are available in each county office. Similar materials are also included in training packets distributed by the Kansas State Board of Education. Extension programs build consumer awareness about dietary guidelines and food safety. Food processors are also assisted in addressing quality assurance, quality control, and hazard analysis issues.

SUPPORT GROUPS

Extension specialists at K-State provide leadership for the North Central Region Extension Food Safety Committee, cooperate with the Kansas Council for Food Safety, and have organized statewide programs in Food Safety Public Policy, Hazard Analysis, and Food Safety for Child Care Providers. Marketing and processing thrusts originated in a Margin of Excellence program but have expanded to include food safety in international and specialty markets. The Kansas Value-Added Center helps Kansas companies produce safe and high quality food products. The KSU DIRECT office provides a single point of contact for information on business and economic development. Post-harvest loss is a serious problem with fresh vegetables, stored grain, and other commodities. Extension specialists have organized innovative programs to minimize loss.

LIVESTOCK PROTECTION

Extension programs are organized to enhance the production of safe, nutritious, and wholesome products which improve profitability. Extension programs address health problems for beef, swine, and cow-calf producers. Health protection strategies, diagnosis, symptoms, and cost-effective treatment are emphasized. Special programs assist dairymen in implementing quality assurance, mastitis control, and milking management programs. Educational thrusts in veterinary medicine focus on proper drug use, food safety, and residue avoidance. Highly successful, these programs have been utilized by nearly 70 percent of the personnel in the feedlot industry. Because of an innovative Extension testing program, numerous feedlots have initiated in-house management and testing procedures.

FACILITIES MANAGEMENT

Extension specialists work intensively with producers whose operations do not meet environmental regulations. Producers are provided technical information with which to reduce the nutrient load, control runoff, and meet environmental standards. Technical assistance is also provided on renovating livestock handling facilities to reduce cattle injury and stress. Extension specialists have demonstrated a fly trap to control flies without the use of chemicals. Fly control trials have also been initiated using a biological control agent.

DANGER AND FIRE INDEXES

Extension specialists calculate and distribute information on the Live-stock Danger Index and the Range Fire Index to facilitate proper manage-ment during extremely cold or hot weather and to enhance safety during prescribed burning procedures.

CROP PROTECTION

Protecting Kansas crops from insect and disease depredation is a continu-ing objective of the Cooperative Extension Service. Kansas farmers and producers utilize crop production schools extensively to obtain information about insect and disease resistance, variety performance, pest control, and crop protection technology. For long- and short-term planning, farmers often want immediate access to crop performance data obtained under a variety of soil, climatic, and other conditions. The data are obtained from research and other replicated trials.

CROP AND SOIL MANAGEMENT

Chinch bug infestations on grain sorghum fields prompted the search for an alternative crop. Extension specialists helped producers adopt needed management techniques and switch from grain sorghum to early planted, early maturing corn. As a result, the production of dryland corn increased 30 percent.

The economic returns from growing wheat for both pasture and grain may exceed returns from growing wheat for grain by \$43 per acre. This practice has great potential: more than 350,000 calves are placed on winter pasture in south central Kansas each year.

Extension agents are emphasizing the use of profile nitrogen tests to maintain yields, reduce nitrogen use, and protect groundwater quality. Wheat yields in south central Kansas have been reduced significantly due to soil acidity. Plots have been established to evaluate crop, variety, and nutrient response on limed soils. The results will help producers develop cost-effective, environmentally sound crop management plans.

FOREST STEWARDSHIP AND DIVERSIFICATION

Forestry programs focus on proper management and multiple benefits for timber, wildlife, water quality, recreation, and aesthetics. Kansas communi-ties are provided assistance in organizing tree boards, planting trees, conduct-ing tree inventories, and in developing long-range community forestry plans.

Farmers who wish to diversify production by growing horticulture or alternate crops are provided assistance in production techniques and market strategies.

WEED CONTROL

Many producers attend intensive, two-day weed management schools. Others obtain needed information in county or community crop management schools. The programs emphasize effective weed control, groundwater protection, and cost-effective management. In southeast Kansas, producers were shown that a postemerge herbicide applied at half rate followed by cultivation effectively controlled weeds and reduced costs.

INSECT CONTROL

Extension specialists have developed a series of visual and computer software decision aids to provide an early warning system, verify treatment need, and reduce scouting requirements. To decrease risk from chinchbug infestations, Extension specialists recommend that grain sorghum not be planted next to wheat. This non-chemical management strategy has materially reduced risk.

DISEASE CONTROL

The spread of wheat streak mosaic virus can be controlled by destroying volunteer wheat. A major campaign has been launched to encourage farmers to "be a good neighbor" and destroy volunteer wheat which also fosters damage by Hessian fly, Russian wheat aphid, leaf rust, barley yellow dwarf virus, and greenbugs.

FARM MANAGEMENT AND ENVIRONMENTAL IMPACT

Because of heightened awareness, data from long-term farm records have been utilized to demonstrate the advantage of using recommended and safe levels of nutrients, insecticides, and herbicides. Those recommendations were incorporated in cost-return crop budgets.








OVERVIEW

Walter R. Woods

Director, Cooperative Extension Service



Today's reports focus on three closely related issues — Food Safety, Livestock Protection, and Crop Protection. These programs enhance the production, processing, and marketing of safe, nutritious, and wholesome food products — products which are essential to the social and economic well-being of Kansans.

FOOD SAFETY

The risks to health from pathogenic microorganisms, primarily bacteria, are the most critical food safety hazards in Kansas and the nation. Cooperative Extension has addressed those problems aggressively. Programs for preventing foodborne illnesses have been organized for food service, school and day care center, and restaurant personnel. Educational packets on food health risks are available in each Extension office and have also been distributed in training packets by the Kansas State Board of Education.

Kansas Extension specialists are recognized leaders in food safety. They provide leadership for the North Central Region Extension Food Safety Committee, helped organize the Kansas Council for Food Safety, and implemented programs in public policy, hazard analysis, and food safety for child care providers. The KSU DIRECT program provides entrepreneurs with a single point of contact where they can obtain information about a variety of business and technology needs. This complements Kansas Value-Added Center (KVAC) programs helping Kansas companies to produce quality products that comply with state and federal regulations.

LIVESTOCK PROTECTION

Livestock protection programs support the profitable production of quality meat and livestock products. They require an integrated approach to health protection, residue avoidance, and quality management systems. Programs have been initiated for beef, swine, cow-calf, and food-producing animals. Those programs center on environmental quality, cost-effective management, and proper treatment strategies.

Proper drug use, food safety, and residue avoidance are central thrusts by Extension veterinarians. Nearly 70 percent of the cattle feeding industry has participated in Extension programs on nutrition, health, and quality assurance. Because of Extension's innovative residue avoidance programs, many feedlots have initiated in-house residue management and testing procedures. Extension engineers also work intensively to help producers upgrade their facilities and meet water quality and environmental standards.

CROP PROTECTION

Extension programs in crop and soil management help farmers cope with weeds, insects, and diseases. Those programs are consistently rated high priority by farm and industry groups. For example, severe chinchbug infestations prompted Extension specialists and farmers to search for an alternate cropping system. Early maturing, early planted corn was identified as a

suitable alternative. Farmers responded to an intensive educational and demonstration program by increasing dryland corn production by 30 percent. Soil tests were also demonstrated to be a cost-effective means of reducing nitrogen use and protecting groundwater.

To minimize loss, Extension specialists provide farmers and ranchers with timely crop performance tests, insect and disease control data, and crop and soil management systems which enhance insect and disease control. Integrated pest management procedures have been developed for all major crops. Because of heightened environmental awareness, Extension specialists have successfully incorporated environmental protection recommendations into cost-benefit budgets, enhancing the use of environmental protection strategies.

EXTENSION PROGRAM HIGHLIGHTS

A few outstanding Extension programs are highlighted below:

1. A KSU Extension specialist was commended for his work on risk and crop insurance by the National Wheat Growers Association and American Agricultural Economics Association.
2. Small businesses are effectively assisted by the DIRECT program, Kansas Value-Added Center, and specialist teams.
3. The risk of chinchbug infection has been materially reduced by recommendations to not plant grain sorghum next to wheat.
4. Warnings given farmers concerning a severe army cutworm outbreak averted a \$6 million loss for wheat producers.
5. Stored grain management programs saved participating farmers \$0.07 per bushel — an estimated \$2.5 million statewide.

OTHER REPORTS

Today's presentations also highlight:

- Extension Program Thrusts
- Food Safety
- Livestock Protection
- Crop Protection

DIRECTIONS FOR THE 90'S

Richard D. Wootton
Associate Director of Extension

The future in Kansas depends, in part, on its people being well prepared to face critical social, economic and environmental issues. Educational programs organized by the Cooperative Extension Service at Kansas State University will play a major role in meeting this need.

EXTENSION EDUCATIONAL PROGRAMS

Extension programs differ from other forms of information transfer. First, the issues addressed are, in large measure, identified by the recipients. Then the educational agenda is arranged to present research-supported alternatives or solutions. At the same time, suggestions are made as to how the informa-

5

1-8

tion can be applied to the client's own situation. The Extension educator encourages the adoption of new technology through this research-to-practice educational model. A wide range of teaching methods are used including computer-based instruction, satellite and electronic transmission, educational meetings, one-on-one instruction and demonstrations.

This educational model has served Kansas well. It works with agriculture, youth, families, community development, and environmental quality. Moreover, it is effective in both rural and urban environments.

CORE PROGRAMS

Extension refers to its on-going, traditional programs as core or base programs. These areas of strength include:

- Agricultural viability
- Community and economic development
- Family strengths and economic well-being
- 4-H and youth development
- Leadership and volunteer development
- Natural resource, energy and environmental stewardship
- Nutrition, diet and health

Extension has strong statewide programs in place to address these traditional land-grant and Extension priorities.

EXTENSION INITIATIVES

To focus on timely topics and supplement core programs, local program development committees and Extension faculty have identified seven specific issues for emphasis. Initiatives to address these issues are representative of Extension's educational efforts and address contemporary topics of concern to all Kansans. Unlike the core programs, which are stable from year to year, the educational initiatives change to reflect issues of current concern.

Cooperative Extension has identified seven initiatives to highlight in 1992: agricultural sustainability and profitability; rural revitalization; water quality; conservation of natural resources; solid waste management; food quality and safety; and youth at risk. We are emphasizing in-service training for state and county Extension faculty; preparation of educational support resources; and development of educational programs for Kansans on these important initiatives.

For example, a crop and livestock protection thrust has been developed within the core program area of agricultural viability. Food safety is a major part of the food quality and safety initiative. Both are excellent examples of educational issues which are being addressed by extension agents and specialists in Kansas.

SUMMARY

The total energy of Cooperative Extension is focused on core programs and special initiatives. The results are tangible. Programs are designed with objectives that can be measured or observed as Kansans make changes and adopt new technology.

Several key elements are essential. A research base backs every Extension program. Comprehensive in-service training keeps agents and specialists on

the cutting edge. Programming is customized to meet specific needs at the county, community, and state level. Thus, well-trained Extension professionals transfer needed technology and hasten its adoption by Kansas citizens.

FOOD SAFETY

Karen P. Penner
Extension Specialist, Food Science
Department of Foods & Nutrition

Extension food safety and quality programs address food safety concerns throughout the food system from production to consumption. Programming areas include: 1) safe food production, 2) food quality assurance and marketing, 3) safe food handling, and 4) improved risk communication. In addition, KSU Extension specialists provide leadership to the Extension Service - USDA Food Safety and Quality Implementation Team which is responsible for developing and implementing the national food safety strategic plan. The North Central Region Extension Food Safety Committee is also chaired by a KSU faculty member. Last year, Cooperative Extension and other organizations were instrumental in the formation of the Kansas Council for Food Safety and Information. Because food safety is a broad concept and has implications throughout the food system, interdisciplinary educational programs have been developed with participation by 12 cooperating departments and four colleges at Kansas State University.

SAFE FOOD PRODUCTION

Extension programs educate crop and livestock producers on proper and legal uses of agricultural chemicals such as hormones, antibiotics, and pesticides. When chemicals are used in accordance with regulations, residues at harmful levels rarely occur in consumer food products. Programs targeted to consumers increase their understanding of agricultural practice, the production and processing cycle, and the risks and benefits of using or not using agricultural chemicals and related production or processing practices.

CROP PRODUCERS

A computerized crop enterprise budget worksheet provides producers with recommended and safe levels of fertilizer, herbicides, and pesticides needed to optimize investment returns. Grain storage programs include research-based chemical recommendations to deter storage losses due to pests, molds, and other factors. Horticulture programs focus on reducing pesticide use and using biological controls.

LIVESTOCK PRODUCERS

Livestock production and health programs for beef, dairy, and swine incorporate information on safe and effective uses of drugs, pesticides, and other chemical products.

CONSUMERS

The program, Consumer's Choice: Lean Meat, includes information on livestock production practices and implications for assuring safety and

7

wholesomeness of meat, nutrition and health issues, maintaining leanness during food preparation procedures, and meat choices in the marketplace.

FOOD QUALITY ASSURANCE AND MARKETING

Extension programs, often conducted jointly with the Kansas Value-Added Center, help food processors produce safe and high quality food products that comply with local, state, and federal regulations. Educational thrusts include quality assurance, manufacturing records, facilities design, and participation in FDA "Better Processing Schools." A special pilot project is underway to develop Hazard Analysis of Critical Control Points (HACCP), a quality assurance program for use in small meat plants.

Post-harvest loss is a serious problem with vegetable and other perishable crops. Growers and packers are provided information about management strategies which enhance the safety and quality of stored produce. Programs on marketing processed foods emphasize maintaining product quality and consumer safety throughout the production and consumption cycle. Food safety is a key component of international marketing programs because international policies impact the management decisions of Kansas producers and processors.

SAFE FOOD HANDLING

Educational programs for food handlers (food service, day care, home, service clubs, and others) focus on maintaining the safety of food as it is handled just prior to eating. The goal is to process food in a safe and sanitary way and prevent illnesses from foodborne microorganisms. Recent Extension programs on Microorganisms and Food helped to increase the food handling knowledge of some 8,000 Kansans. New projects include 1) Food Safety for Family Child Care Providers — a program to improve the food handling practice of individuals who provide child care in their homes and 2) Food Safety in Foodservice — a public policy education program that explores policy alternatives regarding foodservice. Participants in the 16 forums being conducted across the state include local leaders and decision makers and those who work directly or indirectly in the foodservice industry.

RISK COMMUNICATION

The public's perceptions of the risks from various food safety hazards are often different from conclusions drawn by scientists. Cooperative Extension has organized a series of programs to increase Extension educators' understanding of food risks, how the public perceives risks, and how research-generated information on risk can be presented effectively. The Kansas program is part of a national program on risk communication in the food safety arena.

LIVESTOCK PROTECTION

Homer K. Caley, DVM
Extension State Leader, Veterinary Medicine

Food safety and livestock protection is a continuing priority with the Cooperative Extension Service. Cooperating specialists include veterinarians, animal scientists, and engineers. The educational thrust has been targeted to food safety and the protection of livestock and livestock products, especially those that pertain to beef, swine, dairy, and sheep.

HEALTH PROGRAMS

Successful health programs for livestock require an understanding of farm, ranch, and feedlot management practice and familiarity with new vaccines, health management strategies, and industry problems. Extension specialists work closely with farmer feeders, feedlot personnel, and on the kill floor to observe actual practice, monitor problems, and shape relevant educational programs.

Extension's multifaceted approach to livestock protection includes:

VETERINARY MEDICINE

Topics at educational programs are targeted at proper drug use, food safety, and residue avoidance. The objective is to identify actual and relevant problems by spending time on the kill floor and in the feedlot. We watch for damage due to injection sites, trim out, parasites, and liver abscesses. Our approach has been particularly successful in reducing residues and in demonstrating proper treatment protocols. Program participants are asked to conduct the "LAST" residue monitoring test and meet rigorous standards. As a result, several feedlots have initiated in-house testing procedures. For feedlots, target audiences include treatment crews, pen riders, truck drivers, and veterinarians. Surveys show that Extension programs have reached 65 to 70 percent of those in the feeding industry. Volunteer program participants include feedlot managers, veterinary consultants, meat inspectors, and K-State faculty.

QUALITY ASSURANCE

Extension specialists and industry representatives have instituted quality assurance programs to minimize carcass damage, demonstrate proper treatment, and avoid damage due to injury and stress. Producers also are urged to support quality assurance programs instituted by the National Pork Producers Council and others. Quality assurance programs for milk are an integral part of dairy herd improvement programs and focus on milking management, reducing somatic cell count, controlling mastitis, and identifying infected cows. Other pertinent programs focus on animal nutrition, herd health, reproduction, and environmental quality.

WASTE AND FACILITIES MANAGEMENT

Extension specialists work intensively with producers to help them meet health and environmental standards set by law and regulation. Reducing

runoff, minimizing nutrient load, and meeting water quality standards are program thrusts. Technical assistance is often a significant need. Numerous producers also seek technical assistance in upgrading their cattle treating and processing facilities.

ANIMAL DAMAGE CONTROL

Cooperative Extension conducts a statewide program in wildlife damage control. For livestock, the coyote is the most serious predator. Extension programs include demonstrations, educational meetings and, if depredations are serious, on-farm consultation.

CROP PROTECTION

Randall A. Higgins

Extension State Leader, Department of Entomology

Seven KSU departments (agronomy, entomology, plant pathology, grain science and industry, agricultural engineering, agricultural economics, and horticulture and forestry) cooperate in formulating pest management strategies to protect field crops. In addition, these units interact with state and federal agencies, producer groups, and commercial businesses.

Crop protection information is disseminated by satellite, TELENET, radio and electronic transmission, videotapes, slide sets, computer software and public meetings; and by a variety of bulletins, fact sheets, and manuals. For instance, 20 issues of an insect management newsletter were distributed weekly during the growing season to 500 to 1,000 subscribers. Grants were received for a variety of expanded and new projects, including development of handbooks, videotapes, and on-farm action research.

INTEGRATED PEST MANAGEMENT

To lessen dependencies on pesticides, optimal, rather than maximal, yield goals and pesticide use guidelines are used to develop Kansas pest management recommendations. Pest-resistant varieties, rotations, reduced tillage, and alternative crops all play a role in reaching these objectives. Because pest populations are not static, educational programs must be modified and expanded to fit changing needs.

Four years ago, Extension agents and specialists recommended that grain sorghum not be planted adjacent to wheat in areas affected by chinch bugs. This non-chemical management strategy quickly reduced the planting of sorghum in high risk areas from 60 to 20 percent.

RESPONDING TO INSECT DEPREDATIONS

Last spring, wheat and alfalfa growers statewide were faced with a severe outbreak of army cutworms which threatened well over 1 million acres. Extension specialists and survey entomologists from the State Board of Agriculture cooperated to keep growers, consultants, and agribusinesses informed about the rapidly expanding cutworm population. Population densities of 20 to 30 insects per square foot in some areas were capable of destroying entire fields. Agents and specialists provided recommendations and organized educational meetings in 58 counties. Timely treatment was

instituted on over 1 million acres. This effective, coordinated response prevented an estimated \$6 million in damages to wheat alone.

Later in 1991, corn producers and consultants used KSU-developed computer software to predict European corn borer infestations 2 to 4 weeks ahead of the date of needed treatment. These 'early warning tools' gave corn growers adequate time to respond to any threat. Where corn borer populations were especially heavy, growers enhanced yields by \$22 per acre by following the recommendations in the computer model. In areas where corn borer populations were less severe, producers avoided treatments entirely and saved \$14 per acre in many instances.

WEED CONTROL PROGRAMS

Extension programs in weed control are popular among producers: more than 600 participated in 10 in-depth weed management schools. More than 2,000 farmers obtained weed control information from agents and specialists in county and community crop management schools. Those programs focus on identification, competition, and cultural weed control as well as safety, application technology, herbicide mode of action, and environmental protection. Programs are tailored to local needs. In one southwestern program, producers learned how to control yucca (small soapweed) in range. That program also emphasized application technology, drift reduction, groundwater protection, and cost-effective management.

PLANT DISEASES

Systematic survey results reveal that wheat diseases reduced yields by 11.1 percent in 1990 and cost Kansas farmers \$172 million. For grain sorghum, stalk rots and maize dwarf mosaic virus infections can reduce grain yields by 5 percent or more. For soybeans, losses due to charcoal rot, root rots, and soybean cyst nematode are equally serious.

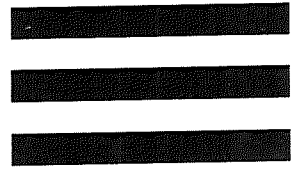
Cooperative Extension plays an important role in minimizing losses by providing farmers with performance tests, data on disease and insect resistance, crop rotations, control of volunteer plants, planting date, and crop and soil management strategies to control insects and disease.

STORED GRAIN PEST MANAGEMENT

Extension specialists have implemented a comprehensive statewide stored grain pest management program. From participant surveys, it is estimated that stored grain management programs annually save participating farmers \$0.07 per bushel individually and \$2.45 million collectively. A new interdisciplinary stored grain pest management program will be targeted to producers with infested grain for sale.

MAINTAINING ADAPTABILITY

To cope with outbreaks of new diseases and insect pests, Extension pest management and crop protection plans must be immediately adaptable. For example, the Russian wheat aphid was newly introduced just a few years ago. Last year, Extension specialists documented the development of a new greenbug biotype, biotype I, which overcame the host plant resistance of hybrids grown on thousands of acres. The situation is further complicated by the introduction of non-traditional crops like canola, dry beans, and sunflowers which are often accompanied by new and unfamiliar pests.



These developments require a major re-evaluation of pest management approaches at least annually and underscore the need for strong Extension and research components if pest management guidelines and programs are to be accurate, up-to-date, cost-efficient, and environmentally sound.



FOOD SAFETY EDUCATIONAL PROGRAMS

The risks to health from pathogenic microorganisms, primarily bacteria, are the most critical food safety hazard in the United States. Cooperative Extension organizes programs in food safety related to foodborne diseases, quality assurance, hazard analysis, and post-harvest technology. Programs are directed to producers, processors, food services, and the consuming public.

FOOD SERVICE SAFETY

Microorganisms and Food

Kansas reports about 400 cases of salmonellosis annually and foodborne diseases are grossly underreported. One estimate suggests an average of .29 to 1.1 cases of foodborne illness occur per person per year. In Kansas this translates to between 0.32 and 2.64 million cases per year. Extension programs directed at preventing foodborne illnesses have been implemented with school foodservice personnel, volunteer church groups, consumers, daycare center personnel, restaurant workers, and secondary school students. Programs have been delivered by extension agents, school teachers and volunteers. Extension educational materials (posters, bulletins, teaching guides, and videotapes targeted to food handlers and teens) have also been included in school foodservice training packets of the Nutrition Services Office, Kansas State Board of Education.

Safety for Bed and Breakfast Enterprises

In response to local requests, specialists and agents organized programs on starting bed and breakfast and child care services. Home-based businesses appeal to many entrepreneurs. In bed and breakfast programs, food safety, laws and regulations, and type of kitchen or food served to guests are stressed. In child care service programs, food safety, nutritional snacks, cleanliness, and the safety of the child care area are underscored. In particular, types of mattresses, safe toys, and playground equipment are of concern. After two such programs, attended by 30 people, two individuals started a bed and breakfast business for hunters and one started a day care center.

CONSUMER AWARENESS PROGRAMS

The Consumer's Choice: Lean Meat

This comprehensive program encompasses agricultural production practices and their relationship to the well-being of those who consume meat. Use of hormones and other production chemicals are explained. Other

modules include nutrition and health, purchasing lean meat, preparation, and processed products. This statewide educational program was developed under the leadership of Extension-USDA staff and involved foods, nutrition, and animal science Extension faculty in Kansas, Florida, and Texas.

Risk Communication

The 1990 Strategic Plan for Food Safety and Quality of the USDA Extension Service identified risk communication as a priority staff development thrust. After participating in a national risk communications workshop, KSU Extension faculty developed an in-service workshop for state and area faculty, focusing on food supply risks and strategies for handling risk issues that impact large segments of the community. Those issues involve food safety, health and nutrition, water and environmental quality, land use and production practice, family and youth, and food and health.

Quality Assurance of Food Products

To remain competitive, food processors must consistently provide a good quality product. An interdisciplinary program of the Departments of Foods and Nutrition and Animal Sciences and Industry addresses issues of quality assurance, quality control, and hazard analysis. This workshop can be adapted for use in stores, small processing plants, and other food service enterprises. Individual consultations are also available.

Food Safety Programs in Northeast Kansas

Food safety throughout the food chain is an emphasis in northeast counties, with programs such as Plate it Safe, Microorganisms in Food, and Food Preservation and Safety. Food safety is the focus of a pilot project conducted in Douglas, Johnson, and Wyandotte counties by agents and specialists. A Meal Time/Family Time program is targeted for households with youth age 7 to 11 to promote family interaction during meal preparation.

Diet Guidelines

A major risk factor for cancer is poor diet. Additionally, many diets are high in fat and sugar and low in vitamins, minerals, and fiber. This educational program, the fifth in a series of seven on implementing Dietary Guidelines, emphasizes the importance of eating protective foods, particularly fruits and vegetables.

FOOD SAFETY SUPPORT GROUPS

Kansas Council for Food Safety and Information

The organization of this council was facilitated by the Cooperative Extension Service. The Council includes state and federal regulatory agencies, farm organizations, KSU research and Extension faculty and food system representatives. The council provides an opportunity for networking, information exchange, and developing coordinated food safety programs. It also links organizational and agency interests with those who can provide accurate regulatory and science-based information.

North Central Region Extension Food Safety Committee

Leadership for this committee is provided by KSU Extension for 12 states in the region, enhancing networking and resource-sharing among land-grant universities. Computer linkages provide faster, more direct communication



about food safety issues and possible emergencies. The committee structure provides for coordinated educational thrusts, development of educational materials, and grant-seeking efforts for multi-state projects.

Food Safety Competitive Grants

Extension faculty in the Department of Foods and Nutrition competed successfully for three USDA-Extension food safety and quality initiative grants. Only 36 projects were funded nationally. The three KSU projects are:

Food Safety in Foodservice: Public Policy Options.

Today, 46 percent of the consumer food dollar is spent on meals eaten away from home. However, 80 percent of reported foodborne illness outbreaks involve food prepared in foodservice establishments. This public policy education program explores public policy options in protecting consumer health when eating food prepared away from home. Community leaders, decision makers, regulatory officials, and others in the food industry are participating in a series of meetings to discuss policy alternatives using an alternatives and consequences model. These forums expand the impact of Extension food safety programs, target broader audiences, and provide for increased networking and cooperation among food service businesses, agencies, and educators.

Hazard Analysis for Critical Control Points (HACCP).

HACCP analysis identifies critical control points in the processing cycle and their associated hazards. Many small locker plants and meat processors are not familiar with HACCP principles or have difficulty adopting them because of their limited economic, personnel, and equipment resources. Because meat is often implicated in outbreaks of food borne disease (9 percent of all outbreaks), it is imperative that meat processing plants adopt procedures to minimize contamination. This program is designed to help small meat processors develop individualized HACCP programs. Once a pilot program is developed, it can be adapted for use in numerous facilities.

Food Safety for Child Care Providers.

Nearly 80 percent of all child care is done by individuals in their homes. All licensed child care providers in Kansas are required to participate in annual training sessions. However, a majority of providers are not licensed and child care facilities may be at high risk for spreading foodborne disease. This pilot program delivers food safety education to family child care providers. All educational materials are being developed in conjunction with the Wichita Child Care Association and an advisory committee from the Kansas Department of Social and Rehabilitation Services, Kansas Department of Education, Kansas Department of Health and Environment, and the Wesley Foundation. Materials will include videotapes, publications, and other resources. After the pilot program is developed, the program will be implemented statewide.

SAFETY IN MARKETING AND PROCESSING

Marketing Processed Foods

This thrust originated in K-State's Margin of Excellence program and emphasizes producing and marketing value-added products. Entrepreneurs

and producers are provided educational programs concerning product development, selecting quality ingredients, and food processing techniques. Food safety, product analysis, labeling requirements, and market development are important considerations. Because distribution channels directly influence ingredients, processing methods, and packaging requirements, processors are encouraged to consider marketing strategies which focus on product quality, shelf life, and food safety. The objective is to produce quality products which are safe, profitable, and appealing to consumers.

Food Safety: International and Specialty Markets

These programs emphasize the production, processing, and special adaptations required for competing in international and specialty markets. Food safety and protection are important considerations where the product must be shipped for long distances and stored for extended periods. International trade is particularly important for grains and is becoming increasingly important for many other Kansas products. Producers and processors are helped to understand how domestic policies, international requirements, and the General Agreement on Tariffs and Trade impact the production, processing, and trading environment.

Food Safety in Value-Added Products

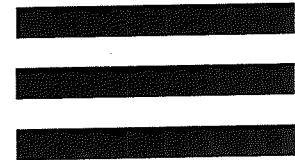
One of the missions of the Kansas Value-Added Center (KVAC) is to help Kansas companies produce safe, high-quality food products that comply with local, state, and federal regulations. To assist new firms, KVAC inspects labels for compliance and assists with nutrition analysis and label preparation. Food processing personnel can also become certified through an FDA Better Processing School. The KVAC food safety training program, conducted cooperatively with the Extension Service, highlights quality assurance, manufacturing records, and facility design. KVAC also serves as a facilitator for the Kansas Council for Food Safety and Information.

Food Safety — Agricultural Production to Consumption

Today, 98 percent of consumers are far removed from agricultural production and are unfamiliar with what happens to food before it reaches the supermarket. Consumers are concerned with food additives, chemicals, and food safety. An interdisciplinary team of specialists have organized educational programs on food safety issues involving pesticides, livestock hormones and drugs, fertilizers, biotechnology, food additives, packaging, and other topics affecting the production, processing, and marketing of food products. The goal is enhanced awareness of food safety and supply. Programs are suitable for a variety of audiences — farmers, ranchers, processors, and distributors.

Grain Grading— Marketing

Efficient grain production and marketing are critical factors affecting the income of Kansas farmers and grain marketing firms. In addition, the cleanliness, quality, and chemical status of U.S. grain is a topic of discussion in both national and international circles. Agents and specialists, with the cooperation of state and federal grain inspection personnel, have organized a series of Grain Grading Schools for producers and grain marketing personnel. Topics include the 1986 Federal Grain Quality Act and U.S. grain grades and grading procedures. Other programs address grain quality and storage and marketing problems.



DIRECT

Cooperative Extension started its DIRECT program in 1987. It became the state's single point of contact for information and programs on business, economic, and rural development with the transfer of Rural Assistance Center KAN-DIAL responsibilities from the Department of Commerce in 1991. Last year, DIRECT handled 1,400 cases from citizens across Kansas. Fully 20 percent of those cases involve the production of value-added foods. DIRECT's responsibility is to provide information and references that will help produce a safe and profitable product. Many of those entrepreneurs are now in production with a product that is both safe and profitable. The key to success is individualized consultation so key production, processing, and feasibility problems can be addressed. DIRECT has established valuable linkages with regulatory and research agencies to facilitate information and technology transfer.

Milling and Baking Seminars for Agents and Leaders

The role of wheat quality in the marketing system is not well understood. Specialists in grain science have organized a three-day seminar, with hands-on laboratory experience, for Extension agents, producers, industry leaders, and others. Its focus is seed selection, seed quality, and milling and baking characteristics of Kansas wheat.

Food Safety for Meat Processors

With increased consumer and regulatory interest in food safety, today's meat processors must pay close attention to sanitary processing procedures. For optimal product shelf life and food safety, sanitary procedures are essential when slaughtering, butchering, grinding, processing, cooking, chilling, packaging, and freezing. Different products require different types of equipment as well as variations in handling and management operations. Special attention must also be given to sanitary and maintenance operations. An interdisciplinary program between specialists in animal sciences and foods and nutrition and agricultural engineers addresses those concerns. Program delivery is through seminars, short courses, and individual consultation which help individual processors with sanitation and Hazard analysis (HACCP) techniques.

HOME FOOD SAFETY

Food Preservation

The Home Food Preservation Program focuses on canning and freezing garden produce. This is an ongoing program that utilizes a videotape series, food preservation notebooks, and publications on fruits and vegetables. A comprehensive USDA publication, Complete Guide to Home Canning, also is available. The program can be organized by volunteers and community leaders or used by individuals or groups.

Recycling Refrigerants

Refrigerants commonly used in automobiles and refrigerators will no longer be produced after the year 2000. R-11, used in some commercial refrigeration systems, has been declared a hazardous substance. Beginning in July, 1992, recycling the refrigerant used in automobiles will be mandatory and venting any refrigerant will be illegal. These regulations will impact

how cars are air conditioned, how food and other products are cooled, and many other aspects of daily life. This program was organized to answer questions and suggest procedures concerning alternate refrigerants, refrigerant recycling technology, and laws and regulations.

Insect Management in the Home

Insect control in the home may involve roaches, termites, ants, and spiders; outdoor insects attacking trees, shrubs, gardens, or lawns; or control of nuisance pests such as millipedes, boxelder bugs, or clover mites. The Department of Entomology assists Extension agents in organizing educational programs in residential entomology and also provides educational materials, publications, slides, or transparencies.

POST-HARVEST TECHNOLOGY

Protecting Stored Grain

A team of entomologists, plant pathologists, grain scientists, and agricultural economists have organized interdisciplinary programs in stored grain protection. Topics include integrated management, grain protectants, grain quality, aeration controllers, continuous and intermittent aeration strategies, and pertinent laws and regulations.

Post-Harvest Grain Technology

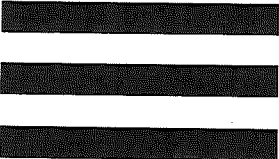
Kansas producers store a substantial volume of grain in both on-farm and commercial storage structures. Programs in post-harvest technology combine resources from entomology, agricultural engineering, and grain science to examine issues related to preventing or minimizing storage losses. Factors such as insect damage, molds and fungi, moisture migration, and aeration are addressed. Reference materials include the Integrated Care Package and the Kansas Stored Grain Management Handbook.

Reducing Post Harvest Losses

Post-harvest loss is a serious problem with many fresh vegetables. Extension specialists have organized educational programs to provide growers with information and strategies to reduce post harvest loss, maintain product quality, and ensure consumer safety. Questions on food safety, food quality, and post-harvest loss are also referred to Extension specialists by the Kansas Value-Added Center. In response, workshops are conducted by teams of specialists to meet producer and processor needs.



LIVESTOCK PROTECTION EDUCATIONAL PROGRAMS



Livestock and food products from animals are researched and monitored throughout the production and processing cycle to identify control points that require special attention to ensure safe and wholesome food products. Consumer confidence in food and food products from animals is critical to the Kansas economy because consumer perception directly impacts demand.

HEALTH AND QUALITY MANAGEMENT

Health Programs for Beef

Successful health programs for livestock require an understanding of new vaccines and other health products utilized by farmers, ranchers, and feedlot operators. This herd health program provides practical information on products and special skills that will assist producers in improving cowherd management, implementing health protection strategies, and understanding the latest advances in veterinary medicine. For enhanced effectiveness the program team includes nutritionists, veterinary practitioners, and other specialists. The program can be customized to focus on calves, replacement heifers, stockers, or feedlot steers.

Health Programs for Swine

The profitability of a swine operation is directly dependent on a competent herd health program. This educational program focuses on respiratory, enteric, and reproduction disease and management problems and can be adapted to producer need. Experienced specialists address herd health problems, new and old diseases, symptoms, and diagnosis. Treatment, prevention, and residue avoidance protocols are given special emphasis.

Cowherd Management

The number of beef cows in Kansas approximates 1.39 million head with a value of \$1.18 billion. Because cows are ruminants, they convert grass and forages from crop residues and untillable land to value-added meat and animal products and contribute significantly to the Kansas economy. Extension agents and specialists utilize demonstrations and county tours to educate cattle producers in the use of management strategies, new techniques, and improved products. This technology transfer program emphasizes animal nutrition, health, reproduction, cost-benefit analysis, and environmental quality. Enhancing productivity and health while reducing cow herd costs is of particular importance.

Mastitis Control and Quality Milk Production

Herds producing low somatic cell count (SCC) milk have a lower incidence of mastitis and receive a quality premium for their milk. Extension programs in mastitis control include four components: 1) Dairy Herd Analyzer — a computer program which assists in evaluating losses due to SCC; 2) Milking Management Clinic — a series of workshops which demonstrate milking strategies and mastitis control programs to reduce the SCC count;

3) SCC Program — individual tests with information and strategies to lower the SCC; and 4) Prostaph Test, available through the Dairy Herd Improvement program, to identify infected cows.

Beef Carcass Quality Assurance

Extension veterinarians and the beef cattle industry have instituted quality assurance programs to minimize carcass residues and enhance the image of beef as a safe and wholesome protein source. One quality assurance demonstration effort involves treating calves intramuscularly and subcutaneously with commonly used vaccines, antibacterials, deworming agents, and other common treatments and subsequently examining the calf on the rail. This demonstration illustrates the relative degree of tissue reaction at each injection site. Producers can personally observe the effect of any improper treatment and assess those effects on consumer confidence and product safety. Pharmaceuticals are essential for preventing and treating disease. However, proper use is essential in assuring consumer confidence.

Livestock Programs in Northeast Kansas

Extension livestock programs in northeast Kansas emphasize food safety through residue avoidance and selection of proper vaccination procedures, injection sites, and recommended withdrawal periods. This cooperative effort includes Extension veterinarians, producer organizations, and industry personnel. Producers are urged to support industry safety and quality programs such as the National Pork Producer Council's Pork Quality Assurance Program.

VETERINARY MEDICINE

Educational Thrusts

Educational programs on proper drug use, food safety, and residue avoidance have historically been a central thrust by Extension veterinarians. Training sessions are directed at feedlot employees, farmer feeders, and ranchers. Surveys and evaluations indicate that 65 to 70 percent of the feeding industry has been represented at Extension meetings. Proper use of prescription drugs and withdrawal time is a current emphasis. Trials on live cattle have been used by the Extension veterinarians to demonstrate the importance of drug withdrawal recommendations. For example, sick animals do not detoxify drugs as quickly as healthy or recovering animals.

Meeting Industry Needs

Educational programs are based on industry needs determined by assessing feedlot practice and monitoring the kill floor for disease and health-related problems. This includes residues, trim outs, bruises, liver and other abscesses, and needle injection sites. Meetings are then organized to address industry problems. Target audiences include feedlot personnel, farmer feeders, backgrounders and other segments of the cattle industry. Cowboy Colleges, limited to four per year, are held in areas where feedlot animals are highly concentrated. Federal meat inspectors are utilized as program participants and resource personnel. Professional improvement information is provided to feedlot employees including pen riders, truck drivers, and processing crews.



Residue Avoidance

Training sessions are held for commercial livestock producers to assist in identifying and managing livestock with potential residue problems. Use of proper materials, residue detection without slaughter, proper treatment, and interpretation is emphasized. A hands-on testing procedure is an integral part of the program. Each participant is asked to conduct the test and meet rigorous performance standards. As a result of these and similar demonstrations, several feedlots have initiated residue management and testing procedures. Processing crews are responsible for vaccinating, deworming, and other needed procedures. Proper handling of treatment drugs, vaccines, and equipment is stressed at each meeting. This helps significantly in minimizing residue and related problems.

Feed Truck Driver's Schools

A major potential feedlot problem involves feed additives. Mistakes made in supplying medicated feed may create unwanted residues in large numbers of animals. Extension programs are directed at preventing and correcting such accidents. Program thrusts include developing proper management skills, effective operational procedures, keeping complete records, and notifying the proper authority.

ECONOMIC FACTORS

Farm Management Programs for Livestock

Farm management programs for cattle producers include backgrounding, cattle finishing, and cow-calf topics. Programs for swine producers include farrow-to-finish, feeder pig finishing, and feeder pig production topics. Programs focus on 1) projected and historical costs and returns for long- and short-term planning, 2) key profitability factors for specific enterprises, 3) coping with variability in costs and returns, and 4) lease arrangements for swine and beef cow facilities.

Livestock Market Outlook

Kansas farmers and ranchers are provided a comprehensive livestock outlook report through a monthly Ag Update series, newsletters, radio and TV interviews, and public meetings. Extension marketing education programs emphasize workshops and classes designed to help Kansas farmers and agribusiness personnel improve their marketing skills.

Applied research of interest to Kansas livestock producers includes the impact on cattle prices of 1) packers' captive cattle supplies, 2) quality, 3) hedging 4) physical characteristics of feeders, cull cows, and feeder pigs, and 5) USDA livestock inventory reports.

FACILITIES MANAGEMENT

Fly Control

Flies are a major pest problem on cattle in southeast Kansas and result in significant weight and economic losses. Insecticide impregnated ear tags, once a popular means of controlling flying insects, are now less effective because of the development of resistant flies. Extension specialists have demonstrated the use of a chute-type trap to control flies without the use of chemicals. Modifications are planned to make the trap more efficient.

Parasitic Wasps and Fly Control

Flies are annoying pests on hog farms, resulting in agitation and weight loss in swine. Flies are also a nuisance to farmers and their families. Fly control trials have been initiated in Franklin County using parasitic wasps. Potentially fly populations can be controlled by allowing the wasps to parasitize and kill fly pupae. Further testing will be required before the use of parasitic wasps can be recommended.

Waste Management

Extension specialists work intensively with livestock producers whose operations do not meet regulations established by the Kansas Department of Health and Environment. During 1991, more than 40 producers received technical assistance. Program objectives include reducing the nutrient load on public waters, developing feasible alternatives for controlling runoff, and maintaining or expanding production capability. This program will expand as livestock producers become more aware of the environmental and water quality impacts of swine and cattle feeding operations.

Livestock Handling Facilities

It is estimated that one out of two people receive minor injuries when working cattle. An intensified program has been implemented to provide technical assistance to livestock producers who are upgrading their handling facilities. During 1991, 75 producers received detailed assistance enabling them to construct safe and efficient facilities in which to treat and process cattle. Improved facilities minimize stress while cattle are being processed and treated. Such improvements provide a significant boost to the Kansas economy.

Livestock Danger Index

The K-State Weather Data Library distributes Livestock Danger Index information which producers use to make management decisions about animal care during cold, winter weather or hot, humid summer conditions. Reports are made available to county Extension offices and producers via Extension's electronic bulletin board system.

Range Fire Index

Extended research trials demonstrate that prescribed burning enhances productivity in bluestem pastures, controls weedy species, improves animal gain, and is an effective pasture improvement technique. In early spring, specialists organize a series of prescribed burning demonstrations. To enhance safety, information from the Weather Data Library is used to calculate the range fire index and determine whether conditions are suitable for pasture burning.

ANIMAL DAMAGE CONTROL

Animal Damage Control

Cooperative Extension is mandated by law to conduct a statewide program in wildlife damage control. Programs include workshops, demonstrations, public meetings, and schools. Consultation can be by phone or on-farm if depredations are serious. Wildlife damage control equipment and supplies that are not readily available locally can also be provided. Extension specialists cooperate with representatives of the Kansas Department of

Wildlife and Parks and animal damage control personnel in the USDA Animal and Plant Protection Service. Assistance is provided to avert damage from moles, pocket gophers, prairie dogs, coyotes, deer, raccoons, skunks, squirrels, sparrows, pigeons, crows, starlings, and blackbirds.



CROP PROTECTION EDUCATIONAL PROGRAMS

Farmers, ranchers, and the consuming public benefit directly from crop germplasm and crop protection management strategies which improve yield, insect and disease resistance, and nutritional quality. Cooperative Extension's role is to help producers realize the full production and economic potential of the crops they grow and the safety and quality of the products they sell.

CROP MANAGEMENT

Crop Production Schools

Crop production schools are popular events among producers, consultants, and agribusinesses. Topics include crop growth and development, variety and hybrid performance, alternative crops, weed control, rate and date of planting, soil fertility, tillage, water use efficiency, and new technology. Teaching methods include demonstrations, field tours, educational meetings, and crop performance, weed control, and environmental protection bulletins.

Early Maturing Corn

When chinchbug infestation in 1989-1991 damaged numerous grain sorghum fields in eastern Kansas, producers sought an alternative cropping system. Research at Kansas State University suggested that early planted and early maturing corn was a feasible alternative. Extension programs were developed to help grain sorghum producers adopt management techniques and switch to early corn production. In 1990-91, some 700 farmers participated in 20 early corn producer schools in northeast Kansas counties. Management techniques were also demonstrated to over 1,000 farmers using field trials and farm tours. In 1990, dryland corn acreage in Kansas increased by 30 percent; additional increases are expected to be documented in 1991.

Wheat Pasture

Kansas is the wheat state and wheat contributes significantly to the Kansas economy. Producers often grow wheat for both grain and pasture. Projections show that economic returns for a wheat grazing and grain harvesting system may exceed returns to a wheat-for-grain system by \$43 per acre. This boosts the Kansas economy because approximately 350,000 calves are placed on winter wheat pasture in south central Kansas alone. At current market prices, this translates into an investment of more than \$172 million.

SOIL MANAGEMENT

Efficient Nutrient Management

Crop production inputs are receiving considerable attention both for their profitability to the producer and their environmental impact. Extension programs are directed at helping farmers utilize all available nutrient sources — fertilizer, manures, legumes, and crop residues. The objective is to adopt economically and environmentally sound crop production systems. Soil testing and efficient nutrient management are an important program focus.

Optimizing Nitrogen Fertilizer Application

Extension agents are emphasizing the use of soil tests for profile nitrogen as a practical method to maintain yields, optimize nitrogen use, and protect environmental quality. With this emphasis, and because of dry weather and increased fertilizer costs, the use of profile nitrogen tests has increased dramatically. Producers have reduced nitrogen use and the potential for groundwater contamination. Research is also being conducted in the Equus Beds area in south central Kansas to monitor nitrogen movement, optimize application rates, and minimize nitrogen loss. Test crops include corn, sorghum, and wheat.

Treating Acid Soils

Liming acid soils is of concern in south central Kansas, especially for growing and grazing wheat. Because excess soil acidity significantly reduces wheat yields, the application of lime is the only known long-term solution. The problem is compounded because the lime requirement is great and transportation and treatment costs are high. Research plots have been established to evaluate crop, variety, and fertility responses on acidic soils. Those results will aid producers in protecting environmental quality and in developing cost-effective, long-term management plans for producing wheat on acid soils.

Fertilizer and Pesticide Placement

This program helps commercial and private applicators, aerial and ground rig operators, consultants and farmers to stay current with the best recommendations and latest technology in applying pesticides and fertilizers. Programs are integrated with crop production and grain protection meetings or are adapted to meet emerging or priority problems.

FORESTRY

Forest Stewardship

Forest stewardship efforts focus on assistance to private landowners to enhance proper management and multiple benefits including: timber production, wildlife, water quality, recreation, and aesthetics. Riparian areas are identified as high priority for forest management and tree planting assistance. Cost-share assistance is provided to qualified landowners to implement timber stand improvement and tree planting practices through state and federal cost-share programs.

Urban and Community Forestry

Interest in Urban and Community Forestry continues to grow. Communities receive assistance in organizing tree boards, tree planting projects,

conducting street tree inventories, and developing long-range community forestry plans. The Northeast Kansas Urban Forestry Council, a volunteer group, promotes tree plantings, care of urban forests and trees, and advises the State Urban and Community Forestry Program.

Supporting projects include developing:

- A list of recommended trees for northeast Kansas.
- A logo and mission statement.
- A tree planting and care publication for distribution through nurseries, realtors, and fairs.
- A tree awareness and benefits publication.
- A program to encourage support for tree planting and community forestry programs.

Walnut Council

Kansas hosted the Walnut Council national meetings in Leavenworth August 4-7 with approximately 200 individuals in attendance. The State and Extension Forestry staff helped plan, organize, and present the conference, which featured field tours at Fort Leavenworth, the Doniphan County Tree Farm, and a St. Joseph, Missouri, veneer mill.

HORTICULTURE

Farm Diversification

Horticulture crops offer opportunities for farmers to diversify. Extension programs address the needs of new and experienced producers in 1) growing horticulture crops; 2) marketing strategies; 3) intensive vegetable production, including plastic mulches, containerized transplants, row covers, and climate modification; 4) fruit farming, including fruit pest management and high density orchard, vineyard and berry crop management; 5) irrigation efficiency; 6) sustainable production methods; 7) weed control; and 8) post-harvest quality control.

Reduced Pesticide Use on Fruits and Vegetables

Extension specialists have developed programs to help growers reduce the amount of pesticides used on fruits and vegetables. For example, the On Target program provides growers with kits to test sprayer equipment to determine if adjustments are required. Agents and specialists have tested and are promoting biological control procedures for cole crops, cabbage, broccoli and cauliflower, and sweet corn. A corn earworm flight prediction monitoring system is also being developed. Accurate predictions of corn earworm infestations in sweet corn will help reduce the use of insecticides. With the help of county agents, specialists are monitoring codling moth populations so growers can more effectively assess treatment thresholds and treatment need. Another program monitors leaf wetness and projects disease development so growers apply pesticides only when needed.

WEED CONTROL

Weed Management Schools

Two-day, in-depth weed management schools are organized for pesticide applicators, pesticide dealers, and upper-level producers. Subjects include

weed identification, plant growth and development, herbicide mode of action, herbicide behavior in soils, pesticide application technology, integrated weed management, and water quality and non-point pollution. More than 600 producers participated in 10 in-depth weed management schools.

More than 2,000 farmers obtained weed control information from agents and specialists in county and community crop management schools. Programs are tailored to local needs: in one southwestern program, producers learned how to control yucca (small soapweed) in range. Programs also emphasize application technology, drift reduction, groundwater protection, and cost-effective management.

Reduced Herbicide Rates for Soybeans

A four-county pilot program for reducing weed control costs was conducted in southeast Kansas. On-farm demonstrations, field trials, and field tours plus a newsletter, newspaper articles, and winter crop schools were used as teaching methods. At field tours, more than 300 producers were shown that a postemerge herbicide applied at a half rate followed with cultivation effectively controlled weeds. As a result, weed control costs were reduced by 32 percent, chemical use was reduced, and, after just one year, the practice was adopted for use on 6,000 acres.

INSECT CONTROL

Losses to Insects

It is conservatively estimated that annual losses to insect pests exceed \$8 million for alfalfa, \$12 million for grain sorghum, \$12 million for corn, and \$20 million for wheat. To reduce loss, Extension specialists help producers with diagnosis, early warning procedures, identification, and recommended and emergency treatment procedures.

Insect Control Decision Aids

Insect management in corn can cost as much as \$50 per acre in some parts of the state. Specialists and agents have organized educational programs to help producers, consultants, and county agents become more cognizant of economic thresholds, economic injury levels, decision making software, and to assess the difference between real and imagined pest losses. In these specialized training events, producers learn to make cost-effective insect management and treatment decisions.

Materials include: 1) Corn Problem Diagnosis slide set used to train producers, consultants, and agribusiness personnel in problem identification; 2) videotape describing European corn borer biology, damage, and control measures; 3) European Corn Borer Phenology and Management software; and 4) programs on non-chemical or reduced chemical management

Stored Grain Pest Management

Some 1.3 billion bushels of all grains are stored annually in Kansas both on- and off-farm. Grain quality often deteriorates during storage due to insect pests and improper management. Extension specialists have implemented a comprehensive statewide stored grain pest management program. From participant surveys, it is estimated that stored grain management programs annually save participating farmers \$ 0.07 per bushel individually and \$2.45 million collectively. Recent changes in chemical-based manage-



ment options (protectants, fumigants, etc.) make it imperative that current information be distributed effectively.

Stored Grain Integrated Care Package (ICP)

The interdisciplinary ICP program is spearheading a program to reach non-traditional users of Extension via an innovative information delivery system. A comprehensive handbook, *Stored Grain Management in Kansas*, has been developed and distributed to county agent and ASCS offices and a series of Grain Problem Diagnostic publications highlighting key topics has been developed. Surveys of farmers and commercial grain storage managers show that individuals needing help often do not seek it. The ICP is designed to provide information to nontraditional users of Extension at critical points in the production, budgeting, and marketing cycle. Cooperating grain elevators and ASCS personnel will distribute educational material on stored grain management when loans are processed, grain is inspected, or substandard grain is offered for sale.

European Corn Borer Management

Survey entomologists estimate that losses due to the European corn borer approximate \$11.5 million annually in Kansas. To reduce losses, K-State specialists have developed computer models that accurately predict egg laying events, significantly reduce the need for repetitive scouting, and target optimum treatment time and need. These early warning tools provide growers with adequate time to respond to insect threats. Where infestations were severe, growers enhanced yields by \$22 per acre by following the recommendations of the computer model. In areas where corn borer infestations were less severe, producers avoided treatments entirely and saved \$14 per acre in many instances. Specialists in Iowa, Nebraska, and major corn companies have requested permission to adapt the program for their needs.

Army Cutworms

Last spring, wheat and alfalfa growers statewide were faced with a severe outbreak of army cutworms which threatened well over 1 million acres. Extension specialists and survey entomologists from the State Board of Agriculture cooperated to keep growers, consultants, and agribusinesses informed about the rapidly expanding cutworm population. Population densities of 20 to 30 insects per square foot in some areas were capable of destroying entire fields. Agents and specialists provided recommendations and organized educational meetings in 58 counties. Timely treatment was instituted on over 1 million acres. This effective, coordinated response prevented an estimated \$6 million in losses to wheat alone. County agents conducted more than 500 field and office visits, handled more than 2,000 phone calls, and devoted more than 1,800 hours to the army cutworm problem in spring 1991.

Blister Beetle Management

Based on new research findings, growers are being advised to avoid the use of insecticides and use care when selecting and using harvesting equipment to minimize blister beetle contamination of alfalfa hay. Ingestion of blister beetles is fatal to some livestock, particularly horses, and may result in serious economic loss and litigation.

Planting Strategies

Four years ago, Extension agents and specialists recommended that grain sorghum not be planted adjacent to wheat. This non-chemical management strategy quickly reduced the planting of sorghum in high risk areas from 60 to 20 percent.

Pesticide Applicator Training

To enhance crop protection and environmental quality, all those who apply restricted use pesticides must be certified. In conducting the program, Cooperative Extension provides all educational materials and the State Board of Agriculture administers all state regulations and tests. During the 1988-1991 planning cycle, 19,189 private or commercial applicators completed their initial or renewal certification requirements. Because the testing requirements are category specific, 23 training manuals are required. Topics include pesticide storage, use, application, safety, labels, equipment, calibration, groundwater contamination, endangered species, community right-to-know, and waste disposal.

Pesticide Impact Assessment (PIAP)

This federally funded program provides producers and agencies with research and management data about new pesticides and control strategies. In the 1988-1991 planning cycle, over 800 inquiries were received which required the use of the National Pesticide Information Retrieval Service. The Kansas PIAP is the focal point for inquiries concerning alternative pesticides, cancellations, suspension, special reviews, sites, pests, and active ingredients. The PIAP program supplies extensive information for risk/benefit analysis whenever pesticides are subject to a special review. PIAP, with the Kansas Agricultural Statistics and Kansas Board of Agriculture, supported a statewide pesticide use survey on corn and soybeans and wheat and sorghum (1991).

CONTROLLING DISEASE

Losses to Plant Diseases

Systematic survey results reveal that wheat diseases reduced yields by 11.1 percent in 1990 and cost Kansas farmers \$172 million. For grain sorghum, stalk rots and maize dwarf mosaic virus infections can reduce grain yields by 5 percent or more. For soybeans, losses due to charcoal rot, root rots, and soybean cyst nematode are equally serious.

To minimize loss, Cooperative Extension plays an important role in providing farmers with performance tests, data on disease and insect resistance, crop rotations, control of volunteer plants, planting date, and crop and soil management strategies which enhance insect and disease control.

Volunteer Wheat Control

Wheat streak mosaic is one of the most important plant diseases in Kansas. Annual losses average about 3 percent which approximates 12 million bushels and \$40 million annually. Losses are greatest when volunteer wheat provides fresh, green habitat for the wheat streak mosaic virus and the curl mite that spreads the virus. A major educational campaign was launched in 1991 to encourage farmers to destroy volunteer wheat. The campaign had two major themes:

(1) The deadly risk of volunteer wheat. Volunteer wheat is responsible for intensifying at least 12 deadly risks associated with wheat production, including wheat streak mosaic virus, Hessian fly, Russian wheat aphid, leaf rust, barley yellow dwarf virus, greenbugs, moisture loss, and others.

(2) The need for community cooperation. Controlling volunteer wheat is critical because wheat streak mosaic virus can travel at least a half mile from volunteer wheat. One neighbor's volunteer can threaten another's new wheat crop. Growers were educated through preplant meetings in numerous county and community meetings, fact sheets, a feature article in Kansas Farmer magazine, several articles in the High Plains Journal, a radio interview, and posters placed on Co-op bulletin boards urging growers to "Be a Good Neighbor, Control Your Volunteer Wheat."

Integrated Pest Management (IPM) in Row Crop Production

Kansas producers are encouraged to utilize IPM principles in controlling row crop diseases because of cost-benefit considerations and because effective fungicides may not be available. Interdisciplinary teams of specialists in entomology and plant pathology have developed IPM programs for each of the major field crops grown in Kansas. These programs address major pest problems, scouting techniques, use of management models, computer software, and chemical, cultural, varietal, and biological control methods appropriate for each crop.

Crop consultants and field scouts have been a major target audience because of the multiplier effect. For instance, Extension specialists met with 12 consultants at a meeting of the Kansas Association of Independent Crop Consultants. These consultants had 360 grower clients in twelve counties and provided production advice for 215,000 acres of Kansas crops. As a result, consultants, scouts, and growers can more effectively use IPM principles for the control of disease and insect problems. This minimizes cost and enhances profitability.

Plant Disease Diagnostic Laboratory

Disease management is an important component of food safety, crop protection, and profitability. The Plant Disease Diagnostic Laboratory provides prompt identification of plant diseases submitted by Extension agents, growers, consultants, scouts, and homeowners. Along with problem identification, recommendations for control or for future prevention are given when appropriate. The diagnostic laboratory receives over 2,500 samples annually. There is no fee, except when specialized tests are required.

Crop Protection Clinics

Crop protection clinics and in-depth insect and disease clinics are a regular feature of county and community meetings during the growing and planning season. Educational materials are often presented by an interdisciplinary mix of agents and specialists. The subject focus is on informing producers, consultants, and others on the latest research based pest management developments (IPM principles and insecticides, fungicides, herbicides, hybrid selection, and other cultural and management practices). The clinics include a discussion of anticipated pest problems for the coming year.

In-depth schools and clinics are conducted for those with a need for a greater understanding of the emerging pest problems growers are likely to face. The emphasis is on pest identification and description, management

strategies, mode of action, environmental and groundwater protection, and the biology and ecology of insect and disease pests.

CROP PROTECTION ECONOMICS

Cost-Return Budgets and Crop Protection

The development of computerized agricultural accounting systems allows for processing year-end whole-farm and enterprise records for more than 2,300 Kansas agricultural producers on an annual basis. In 1990-91, special emphasis was placed on keeping detailed, accurate crop enterprise records. The aggregate crop enterprise analyses were used in an extensive educational program with producers on the use of appropriate and safe levels of fertilizers, herbicides, and insecticides. Recommended safe levels of fertilizer, herbicide, and insecticide were incorporated in farm management guide cost-return crop budgets. These innovative crop enterprise records are used extensively by producers, Extension agents, businesses, and farm lenders.

Natural Disaster Protection

Policy options and alternatives which reduce financial risk due to natural disasters are an important Extension thrust. Topics include current government policy, a standing disaster program, multiple peril crop insurance, and risk protection by private insurance companies or individual farmers. Research results on this issue have been provided to the Kansas congressional delegation, state and national farm organizations, the National Committee for the Improvement of Crop Insurance, Federal Crop Insurance Corporation, and other interested groups. Dr. Art Barnaby, leader of the K-State Extension program on crop insurance, was commended by the National Association of Wheat Growers, and was the recipient of a National Extension Award by the American Agricultural Economics Association for his work on risk and crop insurance.

Farm Management and Environmental Impact

A ten-year study of Farm Management Association members' cash crop farms revealed that farmers have a heightened awareness of the need to minimize energy use, apply economic principles effectively, and protect the environment. Extension agents and specialists were offered training centered on Farm Management in a New Environment. The focus was minimizing chemical use, efficient use of energy, sustainable agriculture, integrated crop and livestock systems, and efficient resource use. Each session included topics on soil protection, water use, and maximizing economic returns while minimizing inputs relative to farm program policies.

Farm Accounting and Analysis

Farm records provide a core of information for farm decision making. Extension programs in farm record keeping help farmers analyze the relationships between costs and returns for making management decisions about production practices, product safety, and crop and livestock protection. For example, cost-benefit analysis is a management tool which can be used to evaluate the economic impact of reduced chemical use, integrated pest management, cultural practices and crop rotations, and commercial fertilizers, insecticides, and herbicides.

Marketing Grain and Specialty Crops

Grain and oilseed crops are consumed as food, fed to livestock, used in industry, or exported. The Extension grain marketing and crop protection program is designed to help Kansas producers identify crops that can be marketed nationally and internationally yet produce grain or oilseeds that are safe, nutritious, and wholesome. For example, health concerns and changes in farm policy have renewed interest in producing alternative crops like canola and sunflowers, oilseed crops that are low in cholesterol. However, growing and marketing alternative crops can present significant challenges, as markets for alternative crops are often poorly developed and volatile. To ensure profitability, educational programs focus on marketing alternatives, marketing identity preserved crops, forward contracting, grain grading standards, and tolerances for chemical residues.

Responding to Government Programs

When the Food, Agriculture, Conservation, and Trade Act of 1990 was passed in November, 1990, Extension programs were immediately implemented to inform producers about their options under the new legislation. This was accomplished through individual consultation, public meetings, mass media, and TeleBridge updates. In northeast Kansas, some 800 farmers received individual evaluations by Extension agents and more than 2,000 attended public meetings conducted cooperatively by the Extension Service and the Agricultural Stabilization and Conservation Service.

COMPUTER SOFTWARE

Computer Software Development

The Computer Systems Office develops and distributes microcomputer programs to help producers protect their crops. For example, the European Corn Borer software package projects the need for insecticide treatment using historical weather data and egg mass counts. Another program, CORN-WATCH, predicts dates on which corn hybrids reach specific plant growth stages using the maturity rating of the hybrid and historic weather data. Growers can evaluate the thermal growth unit requirements and silking and harvest date for several hybrids and choose those best suited to their cropping system. Producers and crop consultants can assess the risk from frost damage for spring and fall crops by utilizing a Freeze Probability software package. The probability with which frost damage will occur is calculated from weather data from a network of 107 observation sites.

CONTROLLING HARVEST LOSSES

Harvest Loss

Last year, Kansas farmers lost \$30 million because of low moisture and field losses at wheat harvest. Agents and specialists emphasize the importance of combine adjustment, timely harvest, and management techniques to minimize post-harvest losses. An average farmer may lose \$8 to \$10 per acre by harvesting when the moisture content is below the optimum range. The largest economic losses occur when harvesting wheat and soybeans.

COPING WITH PEST INFESTATIONS

Maintaining Adaptability

To cope with outbreaks of new diseases and insect pests, Extension pest management and crop protection plans must be immediately adaptable. For example, the Russian wheat aphid was newly introduced just a few years ago. Last year, Extension specialists documented the development of a new greenbug biotype, biotype I, which overcame the host plant resistance of hybrids grown on thousands of acres. The situation is further complicated by the introduction of non-traditional crops like canola, dry beans, and sunflowers, along with a new set of unfamiliar pests.

These developments require a major re-evaluation of pest management approaches at least annually and underscore the need for strong Extension and research components if pest management guidelines and programs are to be accurate, current, cost-efficient, and environmentally sound.



TESTIMONY

on

"The State of the Kansas Agricultural Economy"

to the

Committees on Agriculture

of the

Kansas State Senate

and the

Kansas State House of Representatives

February 6, 1992

Senate Agriculture
2/6/92
Attachment 2

Testimony on
The State of the Kansas Agricultural Economy

My name is Dr. Marc A. Johnson, Professor and Head of the Department of Agricultural Economics at Kansas State University. Agricultural economics deals with the management, marketing, finance and policy aspects of farm businesses and agribusinesses, and serves as the Dean of Agriculture's liaison with the six, nonprofit Farm Management Associations. These associations maintain close contact with more than 2,500 Kansas farm families to assist with financial record-keeping, farm management education and consultation, and data gathering on the state of the farm economy. The latest news presented here is based on conversations with association fieldmen and data from the U.S. Department of Agriculture and the Federal Reserve System.

Kansas farm income in 1991 was less than the relatively strong level of 1990. Some worry about a return to the rampant farm and bank failures of the early 1980s. But today's farm economy does not resemble that of the earlier period. Problems of the early 1980s largely were caused by deep recession, a policy to control wild inflation, a huge farm debt burden, collapsing farm asset and collateral values and a farm policy which prevented grain exports and built large grain surpluses. Today's conditions include a mild recession, a moderate inflation rate, a much smaller debt burden, stagnant to rising farm asset and collateral values (except for cattle), a farm policy which encourages exports and very low grain stocks. In the early 1980s, agriculture was caught in a federal policy morass which provided little flexibility to remedy. Today, income problems stem from recession we are coming out of, drought and livestock overproduction. Agriculture has a much better chance to bounce back quickly due to market forces than was true in the early 1980s. We are not headed for another disaster.

Wheat, feed grain and soybean prices have suffered from lower demand. Strong foreign production, slower foreign economic growth and a stronger dollar in foreign exchange have trimmed exports these past two years. Although food use does not respond greatly to recession, the rate of growth in food consumption is the lowest since 1983. Foreign economic health will continue to flounder into 1992, but food aid prospects have given buoyance to wheat prices. Unfortunately, most farmers sold wheat at low summer prices. Low inventories and less than favorable growing conditions give grain prices and incomes a favorable outlook for those with a crop next year.

The drop in cattle and hog prices chiefly is an oversupply problem. Livestock prices are more susceptible to recessions than are grain prices. But after a long reluctance to increase supply, cattlemen have relaxed their constraints, the supply of beef is growing and prices are falling in a normal response. Hog prices typically cycle every 3-4 years due to supply fluctuation and the industry found itself on the low end of the cycle in 1991. As the meat moves through the market, the industry will adjust production and prices will come back.

Regionally, the best farm income positions are in far western Kansas (Figure 1). Drought was not much of a problem, summer cropping conditions were good and early cattle marketings and the use of futures markets moderated the effect of the drop in cattle prices. Net incomes are expected to be about like those in 1990. In the eastern two-thirds to three-quarters of the state, net farm income is down substantially. Dry weather conditions for both wheat and summer crops resulted in low production to be sold at low prices. Livestock income was lower due to falling cattle and hog prices; protection with futures markets is less likely to be used on smaller farm operations. There is some increase in farm failures although the number is not large.

Those who have been struggling these last 5 years to get back into a sound financial position are in trouble again.

The effect of 1991 income and drought on farm financial viability will be revealed in 1992. Farms are entering 1992 with low grain and feed inventories and lower livestock equity. So, balance sheets typically are lower than in February, 1991. The good signs for 1992 include stronger wheat prices, lower interest rates, stabilizing cattle prices and firming land values. Bankers are caught between a brighter outlook for future farm income and stricter bank regulators looking at today's balance sheet and 1991 incomes. With more normal weather and market trends which are already establishing themselves, 1992 farm income will top last year's, but probably will not match the 1990 level of farm income.

FIGURE 1. Annual Net Farm Income Averages of Association Farms, 1981-1991.**

<u>Year</u>	<u>Northwest</u>	<u>Southwest</u>	<u>North Central</u>	<u>South Central</u>	<u>Northeast</u>	<u>Southeast</u>
1991*	\$35,000	\$39,000	\$21,000	\$24,000	\$27,000	\$24,000
1990	35,000	39,635	42,491	25,695	40,428	36,100
1989	24,237	23,739	19,333	12,729	31,047	38,291
1988	62,177	58,427	40,727	38,716	41,498	57,076
1987	48,658	39,006	40,459	30,387	41,351	46,714
1986	13,719	10,342	21,211	17,414	21,437	18,808
1985	373	10,846	6,149	6,693	4,266	370
1984	10,977	27,690	2,719	8,003	-2,006	666
1983	26,214	27,666	9,491	17,387	671	6,005
1982	6,485	15,701	15,402	16,714	4,795	11,511
1981	-21,025	-12,490	-3,889	6,111	10,312	2,696

* Estimate

**Source: Kansas Farm Management Association databank. These income figures do not represent average income of all Kansas farms. Year to year changes do serve as a reliable index of proportional change in farm incomes.