

Kansas State University

Department of Grain Science & Industry

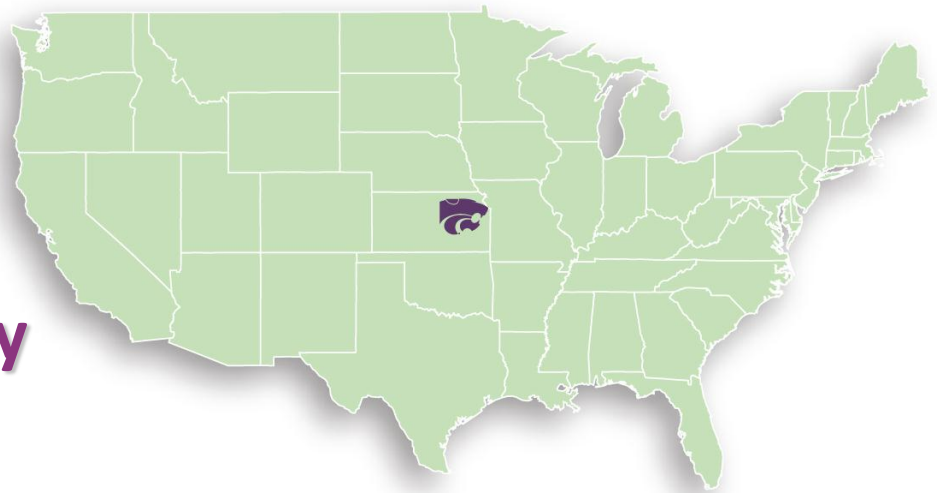
Hulya Dogan
March 30, 2012



“The Wheat State”

- >400 million bu/year (11 million MT/year)
- #1 wheat producing state in the US
- About half of all wheat harvested is sold for export
- Wheat production covers > 10 million acres (4 million ha)

K-State:
**Shaping the future of the
international grain industry**




Kansas State University

- The first land-grant institution in the U.S., founded in 1863
- Over 23,000 students enrolled in more than 200 undergraduate and 100 graduate programs



Department of Grain Science & Industry

- 1910 Formed out of the Department of Chemistry to address the growing needs of the “modern” milling industry
 - 1950-60 Received major funding from the U.S. milling industry to build specialized teaching and research facilities
 - 1951 Added feed science curriculum
 - 1963 Bakery science curriculum from FSU
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- The logo for the Department of Grain Science & Industry at Kansas State University. It features a stylized purple grain stalk with several heads of grain. To the right of the stalk, the text "Kansas State University" is written in a smaller font, and "GRAIN SCIENCE & INDUSTRY" is written in a larger, bold font.
- Only university-based program in the world that offers the combination of UG and graduate degree programs of its kind:
 - BS Milling Science and Management
Bakery Science and Management
Feed Science and Management
 - MS/PhD Grain Science

GSI Faculty





Milling Science and Management (MSM) Program

Milling Science and Management (MSM) Program

- Only bachelor's degree in milling in the world; major supplier for graduates entering the industry.
 - Milling companies, food companies, grain processing companies, government agencies, equipment manufacturers.
- Requires a significant amount of science and technical courses.
- Range of facilities and laboratories
 - Hands-on knowledge of the process
- Student activities (Milling Science Club)
 - Develop leadership skills, create friendship, explore new ideas
- Scholarships
- Internships and summer jobs

MSM-Operations

Calculus	4
Physics	8
Biol + Microbiol	8
Chem	8
Biochem	5
Accounting	3
Econ	6
Statistics	3
English / Comp	6
Public speaking	2
Social Electives	9
Free elective	3
GRSC courses	59
Specialization electives	6

MSM-Chemistry

Calculus	8
Physics	10
Biol + Microbiol	8
Chem	21
Biochem	5
Accounting	3
Econ	6
Statistics	3
English / Comp	6
Public speaking	2
Social Electives	6
Free elective	3
GRSC courses	43
Specialization electives	6

Core courses

GENAG 101 Ag Orientation	1	GENAG 101 Ag Orientation	1
GRSC 101 Intro. to Grain Sci. and Tech.	3	GRSC 101 Intro. to Grain Sci. and Tech.	3
GRSC 150 Principles of Milling	3	GRSC 150 Principles of Milling	3
GRSC 210 Flow sheets	3	GRSC 210 Flow sheets	3
GRSC 310 Material Handling	3	GRSC 310 Material Handling	3
GRSC 405 Food&Feed Analysis	2	GRSC 500 Milling Sci I	4
GRSC 500 Milling Science I	4	GRSC 602 Cereal Sci.	3
GRSC 540/41 Engl Appl. Grain/Food Pro.	4	GRSC 625 Flour and Dough Testing	3
GRSC 602 Cereal Sci.	3	GRSC 630 Mgmt Appl Grain Proc Ind	3
GRSC 610 Elec/Grain Proc. Ind.	3	GRSC 635/36 Baking Science I	4
GRSC 625 Flour and Dough Testing	3	GRSC 651 Food/Feed Prod Prot	4
GRSC 630 Mgmt Appl Grain Proc Ind	3	GRSC 680/681 Milling Sci II	4
GRSC 635/36 Baking Science I	4	GRSC 684 Mill Proc. Tech. Mgmt.	3
GRSC 640 Advanced Flowsheets	2	FDSCI 727 Chemical Anal Foods	2
GRSC 650 Pneumatic Conv.	2	Specialization electives	6
GRSC 651 Food/Feed Prod Prot	4		
GRSC 655 Cer. Food Plant Design	3		
GRSC 680/81 Milling Science II	4		
GRSC 684 Mill Proc. Tech. Mgmt.	3		
AGRON 340 Grain Grading	2		
Specialization electives	6		

Ultimate Hands-on Experience...

Lab / Pilot mill / HR mill

GRSC 150 Principles of Milling	3 h/week
GRSC 210 AutoCAD and Flow sheets	6 h/week
GRSC 500 Milling Science I	6 h/week
GRSC 540/41 Engl Appl. Grain/Food Pro.	3 h/week
GRSC 610 Elec/Grain Proc. Ind.	3 h/week
GRSC 625 Flour and Dough Testing	3 h/week
GRSC 635/36 Baking Science I	6 h/week
GRSC 640 Advanced Flowsheets	6 h/week
GRSC 650 Pneumatic Conv.	3 h/week
GRSC 651 Food/Feed Prod Prot	3 h/week
GRSC 680/81 Milling Science II	6 h/week
FDSCI 727 Chemical Anal Foods	3 h/week
AGRON 340 Grain Grading	3 h/week

Wheat Milling / Grain Processing Facilities

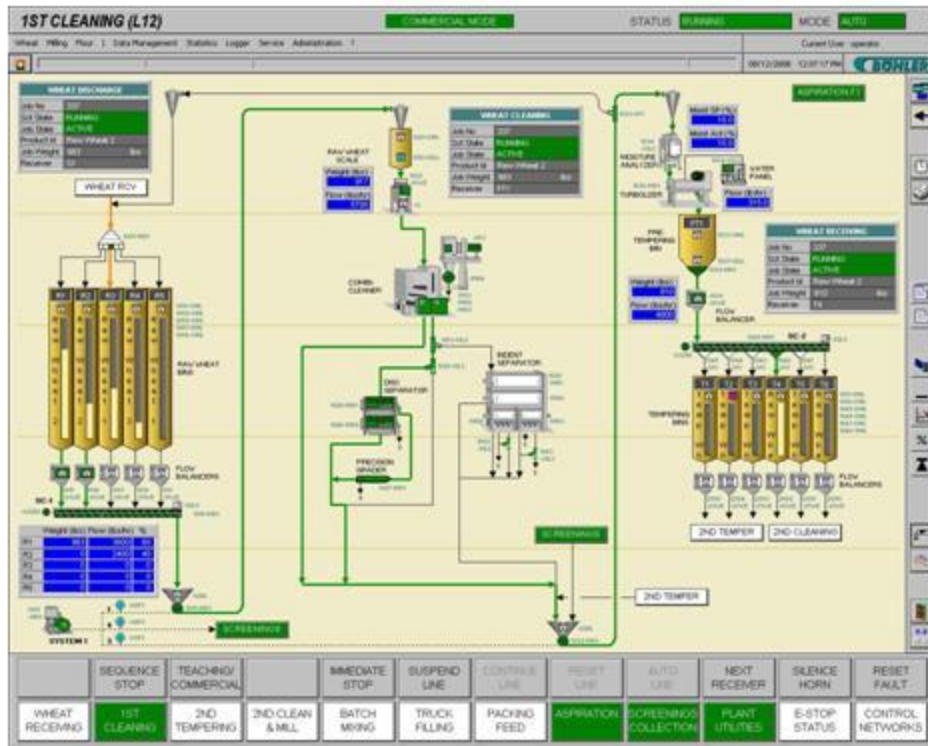
- Range from a bench scale mill (0.5 kg/h) to pilot mill (1 MT/h)
 - Batch vs. continuous
 - Scale & complexity
 - Level of technology
- Teaching lab: Experimental mills (table top Ross mill, Brabender Junior and Senior, Buhler, Miag), hammer mills, ball mill, attrition mill.
- Pilot plant: Shellenberger Hall
- Hal Ross mill: North campus, 2006
- Specialty dry mills (purify, fractionate, and grind and seed-like material, including cereals, pseudocereals, legumes, pulses, spices, gums)
- Other lab-scale facilities available for cleaning and conditioning
- Flour & dough testing, cereal chemistry and research labs

Principles of Milling - Teaching Labs



Hal Ross Mill









Students becoming professionals...



ASB Chicago
March 2011

**Students becoming
professionals...**



Secret to our success...

**Academia-Industry Relations:
K-State Model**

Academia-Industry Relations: K-State Model

- Grain Science and INDUSTRY
- Industry-driven, industry-supported programs
 - Advisory council
 - Curriculum revisions
- Industry funding and other forms of support
 - Facilities
 - Equipment
 - Raw material
 - Instructor positions (Buhler, NAMA)
 - Adjunct teaching (individual)
- Personal development
 - Internships
 - Industry sabbaticals / summer training for faculty
- 100% job placement

2011-2012 GSI Undergraduate Student Scholarships

<u>Program</u>	<u>#</u>	<u>Amount</u>	<u>Average</u>
BSM	49	\$113,307	\$2,312
MSM	44	\$88,780	\$2,017
FSM	31	\$27,040	\$ 872
TOTAL	124	\$229,127	\$1,847
<i>2010-11</i>	<i>135</i>	<i>\$194,565</i>	<i>\$1,452</i>

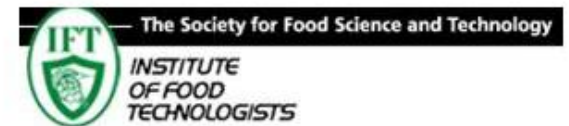
Internships and full-time positions



Partnerships



Flour Fortification Initiative
A Public-Private-Civic Investment in Each Nation



International Grains Program (IGP) Conference Center



- 20,000 square feet
- State-of-the art audio/visual capabilities
- \$4 million project funded largely by Kansas crop producers



**Completed
March 2004**

Bioprocessing and Industrial Value-Added Program (BIVAP)

- Comprehensive extrusion lab to continue specialization on snacks, ready-to-eat breakfast cereals, pet foods and aquatic feeds
- Advanced fermentation methods
- Industrial application of cereal grains and oilseeds
- Client laboratory and office space



***Completed
May 2004***

Hal Ross Flour Mill



- 500 cwt/day capacity pilot facility
- Latest industry technologies (cleaning and peeling, color-sorting, roller mills, sifting and pneumatics)
- Hard, soft and Durum wheat
- Whole wheat milling
- Specialty milling of corn and sorghum
- Simulate various mill flow lengths
- Flexible equipment research area

***Completed
October 2006***



O.H. Kruse Feed Technology Innovation Center



- Teaching, research, service facility
- Science and education wing
- Fall 2012, start construction (18 mo)
- Estimated \$13.5 million project
 - Gift and other cash, equipment commitments

Giving back...

- Well-trained and well-rounded graduates
 - Strong technical training
 - People skills
 - Safety / Labor relations / Unions
- High-quality outreach programs and services to meet domestic and international customer needs and stakeholder expectations
- Executive education
 - Grain purchasing
 - Risk management
 - Flour milling
 - Feed manufacturing
 - Custom short-courses
- On-site training and consultation
- Distance education partnerships (GEAPS, AFIA, IAOM)
- Stand-alone minors



KSU – TFIF – GU Topcuoglu MYO

Future Collaborations

Future Collaborations

- Milling School curriculum development
 - Advisory role
 - Accreditation
 - Train-the-trainer
 - Summer courses
- 2+2 programs
- Visiting faculty, student and industry fellow programs
- Custom-training (IGP)
- On-site training and consultation
- Distance education (both for students and professionals)
 - Stand-alone minors
- Research collaborations
- Publications / Resources

Teşekkür ederim
Thank you
Спасибо



GSI North Complex



Departmental Faculty & Areas of Expertise

Milling & Grain Processing



Dr. Hulya Dogan

Dr. Kingsly Ambrose

Dr. Subramanyam Bhadriraju

Prof. Huseyin Dogan

Mr. Chris Miller

Ms. Fran Churchill

Mr. Royal Denning

Mr. Mark Fowler

Mr. Quenten Allen

Milling, Component Extraction, Purification, Characterization, Dry-fractionation, Value-added Processing, Process Optimization, Energy Efficiency, Food Safety, HACCP, Stored Food Protection

Feed Technology & Grain Operations

Dr. Sajid Alavi

Dr. Leland McKinney

Dr. Dirk Maier

Prof. Fred Fairchild

Mr. Carlos Campabadal

Mr. Jay O'Neil



Feed Manufacturing, Ration Formulation, Extrusion, Petfoods, Aquafeeds, Process Efficiency, Quality Preservation, Stored Product Protection, Grain Operations & Marketing, Biorefinery Operation, Feed Safety & BioSecurity

Cereal & Bakery Sciences

Dr. Jon Faubion

Dr. Yong-Cheng Shi

Dr. David Wetzel

Dr. Rebecca Miller

Mr. Dave Krishock

Mr. Michael Moore



Protein and Starch Chemistry, Characterization, Measurement Technologies, Product Development, Formulation, Ingredients, Flour and Dough Quality, Process Improvement, Quality and Prototype Testing

Bio-based Products & Bioenergy

Dr. X. Susan Sun

Dr. Ron Madl

Dr. Praveen Vadlani



Nonfood Products, Biomaterials, Biopolymers, Enzymes, Fermentation, Extrusion, BioEthanol, Formulation & Prototype Development

GSI Study Abroad Course – China 2009



GSI Study Abroad Course – India 2010



Best possible investment in industry's future



Morton Sosland is editor-in-chief of *Milling & Baking News* and *World Grain* magazines.

In marking as well as in joyfully celebrating this year the 100th anniversary of what is now the highly regarded Department of Grain Science and Industry at Kansas State University, it may be instructive to relate the department's history to the amazing transformation the milling industry itself has experienced in the past century. The same parallel path applies to the other grain-related industries — feed milling and baking — which are now important parts of the department's curriculum. It is not overreaching to declare that the department's path has been hugely affected by changes in the course of these industries, and that the startling changes that have occurred in these industries, in both the United States and around the world, are due in no small part to the influence of the department's faculty, its graduates and the outcome of research in which it has been involved. Understanding this inter-twining is not just essential to appreciating the past but to laying the foundation for future successful growth.

All too often in reviewing the history

of a university institution like the department, developments swirling outside of academia are omitted. In this case, though, that would not only neglect how the department's history relates to the industry's but would minimize one of the most astounding industrial revolutions in modern history.

At the time of the department's beginnings in the early years of the 20th century, flour milling was one of the largest, if not the largest, industry in America. Of course, that comparison comes at a time when industrial development itself was embryonic and the landscape had none of the industries that dominate currently. Thousands of flour mills, mostly family-owned enterprises, operated in nearly every city and even small towns, and the local mill owner was always one of the leading citizens. Employment totals were huge, even as the industry itself had just come off of embracing the new technology of roller milling, to replace stone grinding, that had been accomplished over a period of several decades in the last half of the 19th century.

...the potential benefit for the industry and its member companies from what the department offers is so great that what might be regarded as philanthropy actually involves making one of the best investments possible in the future of the entire industry."

Morton, L. Sosland
Editor-in-chief
Milling & Baking News and
World Grain magazines