

## CURRICULUM VITAE

**NAME:** Conly L Hansen

**PERSONAL:**                      Citizenship:                      United States  
Sex:                                      Male  
Health:                                  Excellent  
Family Status:                      Married; eight children

**WORK ADDRESS:**              NFS  
Utah State University  
Logan, Utah 84332-8700 USA

**HOME ADDRESS:**              1310 E. 3100 N.  
N. Logan, Utah 8431 USA

**CONTACT:**                      Home: (435)-752-2192  
Office: (435)-797-2188  
Fax: (435)-797-2379  
Email: chansen@cc.usu.edu

**PRESENT JOB:**                      Professor, Department of Nutrition & Food Sciences and  
Biological & Irrigation Engineering  
Utah State Univ., Logan, Utah 84332-8700

**QUALIFICATIONS:**              B.S. (1971)  
Mechanical Engineering Department  
Utah State University  
Logan, Utah

M.E. (1973)  
Mechanical Engineering Department  
Utah State University  
Logan, Utah

Ph.D. (1980)  
Agricultural Engineering Department  
Ohio State University  
Columbus, Ohio

**POSITIONS HELD:**

- 1973-1974** Project Engineer (2nd Lieutenant), Bio-Acoustics Division, U.S. Army Environmental Hygiene Agency
- 1974-1977** Project Engineer (Captain), Solid and Hazardous Waste Management Division, U.S. Army Environmental Hygiene Agency
- 1977-1980** Fellow and Graduate Associate, Agricultural Engineering., Ohio State University/Ohio Agriculture Research and Development Center, Columbus, Ohio
- 1980-1985** Assistant Professor; Agricultural Engineering, Food Science, and Bioengineering, Ohio State University/Ohio Agriculture Research and Development Center, Wooster, Ohio
- 1985-1994** Associate Professor; Nutrition & Food Sciences, Civil & Environmental Engineering, and Biological & Irrigation Engineering, Utah State University, Logan, UT
- 1994-Present** Professor; Nutrition & Food Sciences and Biological & Irrigation Engineering and Director, Center for Profitable Uses of Agricultural Byproducts Utah State University, Logan, UT; President, Hansen Energy and Environmental

**ENTREPRENEURIAL ACTIVITIES:**

- 1999**            **Unifoods**
- High pressure injection system (U.S. Patents 6,763,760 5,053,237; many worldwide patents)
  - Flavors and/or tenderizes meat, poultry, and fish
  - Can inject flavor into fruits and vegetables
  - Can add liquids to cheeses that cannot be done any other way after manufacture
  - Sales in Utah, Wisconsin, and Mexico; pending in other places
  - About 50 people have been employed over the life of the company
- 2000**            **Center for Profitable Uses of Agricultural Byproducts**
- Established to strengthen the economy of Utah and particularly the rural economy
  - Developed anaerobic induced blanket digester (IBR) (US Patent 6,911,149)
  - Biogas produced in IBR can be used for heating, running machinery and vehicles, or producing electricity

- The IBR completes digestion in as little as five days versus the twenty days or more common to other systems
- IBR can be adapted to digest a wide variety of agricultural wastes
- Installed cost of IBR systems now in service is \$4.2 million
- It is a major part of the USU Biofuels initiative, selected in 2006 for USTAR funding
- Currently working on technology to grow algae on IBR effluent
  - Oil extracted from the algae can be made into biodiesel
  - Remaining algal components are utilized as substrate for anaerobic digestion, fertilizer, or ethanol
- Entrepreneur of the Year for 2005 at Utah State University
- Researcher of the Year, Biological and Irrigation Engineering Department, USU, 2006
- Distinguished Professor, College of Agriculture, USU, 2006
- Stoll Reves Innovation Award for the induced blanket reactor anaerobic digester, 2007
- AE50 Award Awarded by American Society of Biological and Agricultural Engineers in 2007 for the induced blanket reactor anaerobic digester marketed by AndigenInnovation Award, 2007

**2001            Hansen Energy and Environmental**

- This company primarily exists for doing research in waste and energy management
- Generally not for profit
- Awarded an SBIR grant in 2005
- Building an IBR system in Niger, Africa funded by the World Bank
- Currently negotiating a \$285,000 contract to find a better way to treat human waste primarily for the military at this stage

**2003            Andigen**

- Andigen designs and markets IBR systems
- Andigen anticipates over \$2 million in sales in 2007. Projections are \$50 million in sales/yr in by 2010
- Ten percent of Andigen is owned by USU. Significant royalties and other funds are paid to USU each year for research and development

**PROFESSIONAL EMPLOYMENT:**

**1971-1973    Mechanical Engineering Department, Utah State University, Logan UT**

- Graduate Project: Chemical Treatment of Bovine Manure to Optimize Methane Production by Anaerobic Digestion

**1973-1974     Project Engineer (2nd Lieutenant), Bio-Acoustics Division, U.S. Army Environmental Hygiene Agency**

- Project Officer, research on evaluation of office noise
- Project Officer, research on evaluation of intrusive noisesProject Officer, research on evaluation of exhaust fan noise
- Co-Project Officer, research concerning noise levels generated by army-owned, contractor operated equipment, Vertol Division of Boeing Company
- Co-Project Officer, research concerning acoustical evaluation of air compressor

**1974-1977     Project Engineer (Captain), Solid and Hazardous Waste Management Division, U.S.Army Environmental Hygiene Agency**

- Co-Project Officer, environmental assessment of Sunny Point Military Ocean Terminal, Southport, NC
- Co-Project Officer, research concerning the environmental impact of Walter Reed Army Medical Center, Bethesda, MD
- Co-Project Officer, environmental quality survey for the Defense Fuel Support Point in Cincinnati, OH
- Co-Project Officer, environmental quality survey for the Defense Fuel Support Point in Searsport, MA

**1977-1980     Ohio State University/Ohio Agriculture Research and Development Center, Columbus, Ohio**

- Teaching Assistant:
  - -Design of Waste Management Systems
- Graduate Project:
  - Optimization of Water Usage, Wastewater Management and Associated Energy Usage in a Meat Packing Plant.
- Engaged in the following administrative activities:
  - -Graduate school student representative
  - -President, Alpha Epsilon student chapter

**1980-1985     Agricultural Engineering, Food Science, and Bioengineering Departments, Ohio State University/Ohio Agriculture Research and Development Center, Wooster, Ohio**

- Taught and helped develop the following undergraduate courses:
  - Design of Waste Management Systems
  - Engineering in Agriculture

- Digital Measurement and Simulation in Agricultural Engineering
- Special Problems
- Taught and developed or helped develop the following graduate courses:
  - -Pollution Control and Waste Utilization
  - -Food Waste Treatment and Utilization
  - -Design of Waste Management Systems
- Engaged in the following administrative activities:
  - Chairman, Soil and Water Technical Committee
  - Chair, Ohio Farm and Power Retailers' Association Scholarship Committee
  - Chairman, Essay contest (scholarships) for high school seniors
  - Vice Chairman, Food Engineering Committee
  - Member, North Central Regional Committee
  - Member, Departmental Library Committee
  - Member, Honors and Awards Committee
  - Faculty Advisor to Agricultural Mechanization and Systems students
  - Faculty Advisor to Iota Chapter of Alpha Epsilon
  - Faculty Advisor to Agricultural Engineering students
  - Member, Agricultural Engineering Resident Instruction Committee
  - Member, Soil and Water Resource Committee
  - Member, Biotechnology-Waste Management Committee
  - Member, Home Sewage Disposal Committee
- Research in the following areas:
  - Removing mercury from wastewater using a genetically engineered strain of bacteria.
  - Producing biogas (methane) from dairy manure
  - Research on animal by-product processing
  - Recycling of mercury waste
  - Research concerning methods of reducing energy usage in food processing
  - Research concerning optimization of Water Management and Associated Energy in a Meat Packing Plant.

**1985-present Nutrition & Food Sciences, Biological and Irrigation Engineering Departments, Utah State University, Logan, UT**

- Taught or are currently teaching the following undergraduate classes:
  - NFS 359 Meat Plant Engineering
  - NFS 444 Food Engineering
  - NFS 492 (developing and teaching) Capstone Course in Food Science

- Taught or are currently teaching the following graduate classes:
  - NFS 506/606 Food Processing
  - NFS 544 Food Engineering
  - NFS 690 Special Problems
  - NFS 697 Thesis Research
  - NFS 699 Continuing Graduate Advisement
  - NFS 797 Dissertation Research
  - NFS 799 Continuing Graduate Advisement
  - NFS 4440 Food Processing
  - BIE/NFS 5610 and 6610 Food Engineering
  
- Engaged in the following administrative activities:
  - Member, Scholarship Committee, NSF (1991)
  - Member, BIE Curriculum Review Committee (1993-)
  - Member, NFS Search Committee (1993)
  - Member, CQI in Engineering Committee (1993)
  - Member, Agricultural Sanitation and Waste Management Committee (1993-)
  - Chair, NFS Undergraduate Students Recruitment Committee (1993-)
  - Member, Biotechnology Center Advisory Committee (1993-)
  - Member, ASAE Biotechnology Committee (1993-1998)
  - Chair, BIE Search Committee for Biological Engineering (1994)
  - USU Biotechnology Center Advisory Committee (1994-1998)
  - Faculty Senator (1994-1997)
  - Chair, Choosing Directions in Research in NFS Department Committee (1995)
  - Faculty Senate Executive Committee (1996-97)
  - Chair, NFS Space Committee (1996-99)
  - USU Faculty Evaluation committee (2000-2001)
  
- Research in the following areas:
  - Optimization of Multi-Stage Anaerobic Digester, Digesting Agricultural Wastes
  - Anaerobic Digestion of Rendering and Fish Processing Waste in an Upflow Anaerobic Sludge Blanket Digester and a Two Stage Anaerobic Digester
  - Biological Detoxification of Mercury Contaminated Water and Soil
  - Cadmium Effect on Biological Removal of Mercury
  - Production of Ultrafiltered Skim Milk Retentate Powder, Composition and Physical and Functional Properties
  - A Method for Measuring the Water Holding Capacity of Milk Powders
  - Sodic Soil Reclamation Using Cottage Cheese (Acid) Whey
  - Fate of Chemical Oxygen Demand from Cottage Cheese (Acid) Whey Applied to a Sodic Soil
  - Gas Production From Land Applied Whey
  - Pressure, pH, Temperature and Moisture Profiles During Processing of 290-kilogram Stirred-curd Cheddar Cheese Blocks

- Handling Food Processing Waste
- Production of Non-fat Dairy Whipped Topping
- Production of Low-Fat Yogurt Cheese Product (Sjilke™)
- Development of a High Pressure Food Injection Apparatus
- Development of a Laser Apparatus to Measure Syneresis in Real Time
- Functional Properties of Extruded Dairy Proteins
- Moisture Movement in Low Fat Cheese
- Anaerobic Digestion of Cellulose
- Straw Buildings for Energy Efficiency with Low Cost
- Development of New Products Using Mechanically Deboned Meat From Trout Frames
- High Pressure Injection of Cheese
- Full scale anaerobic digestion of dairy manure

### **TECHNICAL AND PROFESSIONAL SOCIETIES**

ASAE, American Society of Agricultural Engineers  
 Pacific Northwest Section of ASAE  
 Institute of Biological Engineers  
 IFT, Institute of Food Technologists  
 Bonneville Section IFT  
 ADSA, American Dairy Science Association

### **HONORS, PROFESSIONAL REGISTRATION, SPECIAL RECOGNITION:**

Sigma Xi  
 Sigma Tau, Honorary Society in Engineering  
 Gamma Sigma Delta, Honorary Society in Agriculture  
 Alpha Epsilon, Agricultural Engineering Honorary Society  
 Professional Registration : Ohio: # E-44078 and Utah: # 170636-2202  
 Captain, US Army, honorably discharged 1/19/77.  
 Graduate Student Alumni Research Award, Ohio State Univ., 1978.  
 Outstanding Young Men of America, 1982.  
 ASAE leadership conference "Vision 2007", 1993.  
 President's appointment to a committee to determine how biological engineering can be integrated into ASAE, 1992.  
 Researcher of the Year, awarded by the College of Family Life, Utah State University, Logan, UT, 1993.  
 Consultancy to India for the Food and Agricultural Organization of the United Nations, September, 1993.

Associate Editor for *Transactions of the ASAE*, and *Applied Engineering in Agriculture* (1993-2001)

Sabbatical to Australia sponsored by the Australian Dairy Research and Development Corporation and the University of Melbourne, Dookie Campus (August, 1995-February, 1996)

Secretary, 1995-96; Vice Chair, 1996-97; and Chair, 1997-1998 of Food and Process Engineering Institute

Utah State University Faculty Senator (1994-1997)

Utah State University Faculty Senate Executive Committee (1996-97)

Member of Biotechnology Center Faculty Advisory Board representing the College of Engineering, 1996-1998

Certified Odor Assessor for the National Pork Producers Council, 1998

Advisor to Student Winner of Padnos Prize, an International Student Design Competition, 9/1998

ASAE Council Member: Publications, 1998-99; and Membership Development, 2000-2002. These are two of five councils that guide activities of the American Society of Agricultural Engineers

Director of Bioprocess Engineering, Department of Biological & Irrigation Engineering, 1998-2002.

Meetings Coordinator for the year 2000 Annual Meeting, Institute of Biological Engineers

Advisor of the year in Biological and Irrigation Engineering Department, USU, 2000

Director of Center for Profitable Uses of Agricultural Byproducts, 2000-

President, Hansen Energy and Environmental, 2004-

Researcher of the Year, Nutrition and Food Sciences Department, USU, 2005

Teacher of the Year, Biological and Irrigation Engineering Department, USU, 2005

Runner up for Professional Employee of the Year for USU, 2005

Entrepreneur of the Year, TCO, Utah State University, 2006

Researcher of the Year, Biological and Irrigation Engineering Department, USU, 2006

Distinguished Professor, College of Agriculture, USU, 2006

Stoll Reves Innovation Award for the induced blanket reactor anaerobic digester, 2007

AE50 Award Awarded by American Society of Biological and Agricultural Engineers in 2007 for the induced blanket reactor anaerobic digester marketed by Andigen

### **SCHOLARSHIPS:**

Research Assistantship awarded and funded by Utah State University, 1971-1973.

Fellowship, Ohio State Univ., funded by Flavorland Industries, 1977-1978.

Research Assistantship awarded and funded by Ohio State University, 1977-1979

### **INVITED GUEST SPEAKER:**

Ohio State University Dairy and Food Industry Conference, Feb. 13-14, 1985. Columbus, Oh.

International Conference on Innovative Biological Treatment of Toxic Wastewaters. June, 1986. Arlington, Va.

Utah Education Renewable Energy Resource Conference. Nov. 1986. Salt Lake City, UT.

Ice Cream Short Course. Utah State University. Feb. 23-24, 1987. Logan, UT.

Symposium on design and utility of anaerobic processes for waste treatment and energy recovery, Univ. of Wisconsin-Milwaukee. July 29-31, 1987. Milwaukee, WI.

Short Courses, Principles of Freezing, Energy Utilization/Waste Disposal and Refrigeration, Utah State University, Jan, Feb & March, 1988. Logan, UT.

Nineteenth Annual Symposium on Food Science, Institute of Food Technologists, Intermountain section Symposium, March 10-11, 1988. Sun Valley, ID.

Seminar on whey treatment and utilization presented at Idaho Groundwater Quality. Nov 30-Dec 1, 1988, Twin Falls, ID.

Chair, American Society of Agricultural Engineers Roundtable Series, Agriculture's Contract with Society, June 23-26, 1991, Albuquerque, NM.

Chair of session entitled, "Industrial waste treatment", selected as a "Presidential Theme Session" at the Winter Meetings of ASAE, Dec, 1991, Chicago, ILL.

Keynote address at rap session on Environmental Protection, ASAE Winter Meetings, Dec, 16, 1991, Chicago, ILL

Seminar, Utah State University, Civil and Environmental Engineering Departments, Nov, 1991.

Seminar, Utah State University, Civil and Environmental Engineering Departments, Feb, 1993.

Engineering State, Utah State University, June, 1991-1993.

Summer Institute for Utah State University College of Agriculture, Aug 8-13, 1993.

Seminars on Agricultural Waste Utilization and Research Philosophy, National Dairy Research Institute, Karnal, India, Sept., 1993

Seminar Agricultural Waste Treatment and Utilization, Punjab Agricultural University, Ludzian, India, Sept., 1993.

Cheese Making Short Course, Utah State University, Feb, 1994.

Keynote Address at 1994 Annual Meeting of the Pacific Northwest Section of the American Society of Agricultural Engineers, Utah State University, Logan, UT, Sept. 14-16, 1994

Keynote address at Australian Dairy Research and Development Corporation Seminar on Dairy Waste Practices in Australia. February 9, 1996, Monash University, Melbourne, Australia.

Chair of Session entitled, "By-Product Utilization/Biodiesel-General at third Liquid Fuels and Industrial Products from Renewable Resources Conference, Sept. 15-17, 1996, Nashville, Tennessee.

11th World Congress of Food Science & Technology April 22-27, 2001, Seoul, Korea. Also asked to chair session, S5-4 Food Wastes And Environment.

**DISTINCTIONS AND APPOINTMENTS IN NATIONAL AND INTERNATIONAL COMMITTEES/ORGANIZATIONS:**

Member, American Society of Agricultural Engineers

Member Meetings Council 1999-2000 representing the Biotechnology Division  
Associate Editor 1993- 2001  
Member Publications Council 1998-99 representing FPEI  
Chair (1997-98), Vice Chair (1996-97) and Secretary, (1995-96) Food Process Engineering  
Institute  
Member, FPEI Steering Committee, 1988-89, 1992-99  
Member, Food Waste Management Committee 1986-present.  
Chair, Food Waste Management and Utilization Committee, 1993, 1999  
President, Biotechnology Executive Committee, 1994-95  
President, Biotechnology Advisory Committee, 1994-95  
Chair, Technical Group, Food & Process Engineering Institute (FPEI), 1987  
Member, Agricultural Sanitation and Waste Management Committee, 1987-88  
Appointed to task force to address how biological engineering can be better integrated into  
ASAE, 1991-1992  
Member, Development & Inter-society committee, 1991-93  
Participant, Vision 2007 Conference, Aug 26-28, 1993 St. Joseph, MI.  
Member Pacific Northwest Section ASAE  
Vice Chairman over Professional Development, 1994-95  
Professional Member, Institute of Food Technologists  
Secretary/Treasurer, Bonneville Section 1990-91  
President, Bonneville Section of IFT, 1993-95  
Member, Institute of Biological Engineers, Meetings Coordinator (2000)

**FOREIGN COUNTRIES VISITED ON A PROFESSIONAL BASIS:** (Lectures on organic and hazardous waste management were given in all of these countries, except Italy, which purpose was to report to the UN. A United Nations consultant ship was done in India.)

Australia 1995	Italy 1993
Belgium 1989	Japan 1993
Canada 1989	Korea 1988
China 1988	Korea 2001
Egypt 1994	Canada 2001
Germany 1989	Japan 2001
Hong Kong 1988	France 2004
India 1993	

**RESEARCH CONTRACTS AND GRANTS:**

**Funded with Cash** (55 for a total of \$6,937,112)

Sustainable Energy Center – Biofuels group. Byard Wood, Conly Hansen, Lance Seefeldt, and Ron Sims Co Principal Investigators. Utah Science Technology and Research Initiative \$6.5 million 1/1/07-12/30/12. My involvement is 25% of the project total.

Using Biofuels in Vehicles. Carl Hansen, Carl Hansen, PI and Conly Hansen Co Investigator. \$78,854 5/1/06-4/30/07.

Cost effective and Reliable Anaerobic Digestion for animal feeding operations. Carl Hansen and Conly Hansen, Co-PI's. USDA Conservation Innovation Grant. \$740,400, 09/01/2004 - 09/01/2006.

Nutrient Management Technology for a Dairy Farm. Conly and Carl Hansen, Farm Pilot Project Corporation (USDA). Principal Investigator. \$254,496, 9/1/05-3/31/07.

Research and Demonstration of Anaerobic System on a Large Dairy Farm. US Department of Agriculture & US Department of Energy Principal Investigator. \$761,385, 10/1/03-12/30/05.

Center for Profitable Uses of Agriculture Products. Utah Centers of Excellence Program, \$60,000, 7/1/04-6/30/05, Principal Investigator.

Center for Profitable Uses of Agriculture Products. Utah Centers of Excellence Program, \$120,000, 7/1/03-6/30/04, Principal Investigator.

Demonstration of Production of Electricity from Swine Manure. Utah Pork Producers Council, \$15,000, 5/1/03-1/30/04. Principal Investigator.

Development of a Reliable and Cost Effective Gas Conditioning Process for Small Applications to Generate Electricity from Biogas. US Dept. of Energy, \$29,500, 6/1/03-12/31/03. Principal Investigator on USU's portion.

Profitable Uses of Agricultural Byproducts. US Dept. of Agriculture, \$89,736, 3/03-2/28/04. Principal Investigator.

Utilization of Biogas Produced from Swine Manure to Produce Electrical Energy. Utah Pork Producers Council, \$15,000, 9/1/02-6/30/03. Principal Investigator.

Biomass Power. Utah Department of Energy Services pass through money from US Dept of Energy. \$98,931, Oct/1/2002-1/9/2003. Principal Investigator

Cultivation of Mushroom Mycelia Using Whey Permeate. Dairy Management Incorporated, \$115,000, 2/1/2003-1/31/2005. Principal Investigator.

Center for Profitable Uses of Agriculture Products. Utah Centers of Excellence Program, \$105,000, 7/1/02-6/30/03, Principal Investigator.

Utilization of Biogas Produced from Swine Manure to Produce Electrical Energy, Utah Pork Producers Council, \$13,000, 6/2001-5/30/2002. Principal Investigator.

Center for Profitable Uses of Agriculture Products. Utah Centers of Excellence Program, \$100,000, 7/1/01-6/30/02, Principal Investigator.

Center of Excellence in Profitable Uses of Agricultural Byproducts. Utah Centers of Excellence Program, \$100,000, 7/2000-6/2001. Principal Investigator.

Development of a Bioprocess Injection System to Control Cheese Flavor Properties. Dairy Management Incorporated, \$163,580, 7/1/1999-12/31/2001, Co-principal Investigator.

Development and Testing of Drum Composter and Associated Anaerobic Digester for Treating Organic Wastes, Environmental Products and Technologies, Westlake Village, CA., Variable amount depending on costs. \$10,000 in 1998, \$107,500 in 1999, plus in-kind contribution of about \$200,000 in 1998-1999. Project time period 6/1998-Indefinite. Co-Principal Investigator.

Center of Excellence in Alternative Uses of Agricultural Products. State of Utah, \$10,000 planning grant awarded 7/1998 for one year. Principal Investigator.

Design and Construction of Machine to Inject Foods. Gold River Foods, Gold River, Washington, \$40,000, 6/1998-12/1998. Principal Investigator.

Development of a Cheese Injection System. Western Dairy Research Center, \$9,650, 1/1/1998-6/30/1998. Principal Investigator.

Bioenergy Demonstration Producing Energy From Trout Waste. Western Regional Biomass Energy Program (U.S. DOE) and State of Utah Office of Energy Services, \$28,980, 9/15/97-9/14/99. Principal Investigator.

New Products and Processes for the Aquaculture Industry in Wayne County, UT. Rural Development Administration and Farmers Home Administration, USDA, \$167,093, 7/1/95-9/30/96. Principal Investigator.

Performance Evaluation of Anaerobic Digester Treating Dairy Processing Effluent. Australian Dairy Research and Development Corporation, \$13,000, 12/1/96-6/30/97. Principal Investigator.

Use of Deboner for Producing a New Product for Human Consumption From Trout By-products. Utah Department of Agriculture, for one time purchase of Beehive deboner, \$15,000, Principal Investigator. Principal Investigator.

Development of a Dairy Based Extruded Food Product. Western Center for Dairy Protein Research and Technology, 7/1/95-6/30/96, \$42,000, Principal Investigator. Pending

Optimization of the Process Technology for Producing a New Low Fat Soft Cheese. National Dairy Promotion and Research Board \$240,448.75, 7/1/95-6/30/98 Principle Investigator. Pending

Anaerobic Digestion and Utilization of Fish for the Areas of Southern Utah to Improve the Quality of Life. Farmers Home Administration/ United States Department of Agriculture, \$112,000, 9/30/94-12/31/95, Principal Investigator

Extrusion Processing of Milk Proteins and Powdered Sweet Cream. National Dairy Promotion and Research Board, 7/94- 12/96, \$103,053 Principle Investigator.

Integrated Product, Package & Process Development (IPPPD) in the Food Industry, USDA. 9/1/93-8/31/95, \$65,000, Co-Principal Investigator.

Development of High Protein Low Fat Fermented Dairy Foods from Yogurt-Cheese. Western Center for Dairy Protein Research and Technology, 4/1/93 - 3/31/94, \$39,242, Principal Investigator.

Extrusion Processing of Skim Milk Proteins. Western Center for Dairy Protein Research and Technology, 7/1/92-6/30/94, \$76,850. Principal Investigator.

Anaerobic Digestion of Whey and Other Dairy Wastes In a Two Stage Digester. Utah Department of Agriculture and U.S. Department of Energy, 2/92-6/30/94, \$155,000, USU share: \$38,000. Principal Investigator for USU contract.

Development of a Formulation for Whipped Topping Using Enzyme Treated, Dried Retentate Powder as a Base. National Dairy Promotion and Research Board, 7/91- 6/93, \$28,000 Principle Investigator.

Development of a Process for Production of UF Milk Retentate. Western Center for Dairy Protein Research and Technology, 7/1/90-6/30/93, \$123,987. Principal Investigator.

Microbial Production of Food Stabilizers From Milk and Whey Permeate. Biotechnology Program, Utah State University, 7/91-6/92, \$15,000 . Co-Investigator.

Biological Detoxification of Mercury Contaminated Soil. Biotechnology Program, Utah State University, 7/90-6/91, \$15,060. Principal Investigator.

Bioreactor Design For Biological Removal of Mercury. Hazardous Substance Research Center for U.S. EPA Regions 7 & 8 and U.S. Department of Energy, 6/30/90-5/31/91, \$68,760 (\$38,477 from outside, the rest is matching funds from USU). Principal Investigator.

Lollipop Formulation and Packaging Research. Small Business Development Center, 10/89-12/89, \$160. Principal Investigator

Biological and Physio-Chemical Remediation of Mercury Contaminated Hazardous Waste. United States Environmental Protection Agency, 6/89-5/92, \$88,000. Principal Investigator.

A New Method for Method for Measuring Syneresis of Renneted Gels Applied to Development of Cheese. National Dairy Promotion and Research Board ,7/89-6/91, \$51,195. Principal Investigator.

A New Method for Method for Measuring Syneresis of Renneted Gels Applied to Development of Cheese. Western Center for Dairy Protein Research and Technology 7/89-6/90, \$3,000. Principal Investigator.

Cooling Rate of Cheddar Cheese: Comparison Between 40 and 640 lb Blocks and Uniform Cooling of 640 lb Blocks. Western Center for Dairy Protein Research and Technology, 11/88-12/90, \$42,742. Co-principal Investigator.

Anaerobic Processes for Treatment/Utilization of Food Processing Wastes. Utah State University Agricultural Experiment Station, 2/86-present, variable funding. Principal Investigator.

Cogeneration of Biogas and Single Cell Protein From Ultrafiltration Permeate and Whey. Western Center for Dairy Protein Research and Technology, 6/87-5/89, \$47,015. Principal Investigator.

Fluid Jet Injection for Tenderization and Juiciness of meat from Lean Animals. Utah State Dept. of Agriculture, 6/86-5/87, \$12,000. Principle Investigator.

The Biological Removal of Mercury from Contaminated Waste. Utah State University Faculty Grant, 7/86-6/88, \$13,000. Principle Investigator.

By-Product Recovery from Wastewater. Inland Products Company, Inc., 10/84-10/86, \$10,000 through second year and ongoing for related research. Dr. Hansen left OSU; Inland Products continued to support OSU. Principal Investigator.

Biological Removal and Recycling of Heavy Metals from Industrial Wastewater, Sediments and Sludges. National Oceanic and Atmospheric Admin., 9/1/84-8/31/87, \$85,000. Co-Principal Investigator.

Biological Detoxification of Sludges Contaminated with Heavy Metals. Ohio State University Graduate School Grant-in-Aid, 8/84-7/85, \$3,650 for one year. Principal Investigator.

Improved Waste Utilization Treatment and Associated Energy Conservation in Agriculture. OARDC (Ohio state funding), 7/1/84-6/30/87, \$5,000. Principal Investigator.

Biological Detoxification of Aqueous Solutions Contaminated with Heavy Metals. OARDC (Ohio state funding), 7/1/84-56/30/87, \$5,000. Principal Investigator.

Biogas (Methane) from Dairy Manure. Ohio Department of Agriculture, 9/82-8/85, \$37,690. Co-Investigator.

Recycle of Mercury Waste. Ohio State University Small Grant, 3/81-2/82, \$4,835. Principal Investigator.

Energy and By-Products from Animal Manure. OARDC (Ohio state funding), \$5,000, 11/1/80-10/31/85. Co-Investigator.

Optimization of Water Usage and Related Energy Usage in a Meat Packing Plant. Ohio State University, 10/78-9/80, \$400. Principal Investigator.

**Gifts in kind** (4 for a total of \$233,160)

10/2001. Control equipment for aerobic and anaerobic bioreactors at Caine Dairy, USU's dairy located in Wellsville, UT. Donated by Specialized Analysis Engineering, Logan, UT, \$23,660.67.

6/1998 - 9/2000. Drum composter and manure pad at Caine Dairy. Donated by Environmental Products and Technologies, Westlake Village, California, \$200,000

1/90 Safeway Inc. Donation of new, 15 horsepower, refrigeration compressor, reverse osmosis pump and variable speed pump. Estimated value: \$5000.00.

1/90 Arizona instrument. Donation of Model 511, Gold Film Mercury Analyzer. Estimated value: \$4500.00.

**CONSULTANTSHIPS:**

- Environmental Products and Technologies. 7/98-present. Help with evaluation of EPT's composter technology and work on development of anaerobic technology to treat agricultural production and processing wastes
- Warrnambool Milk Products. 12/97. The objectives of this project were to: 1. Gather data on the anaerobic digester at Warrnambool Milk Products, Allansford, Victoria, Australia which was a bulk volume (BVF) design to enable a performance evaluation of the digester. 2. Do a performance evaluation on the WMP digester to determine the capabilities of the technology including the loading limit and amount of caustic that may have to be added. 3. Develop a protocol for operation of the BVF digester to sustain the best treatment capability possible. and 4. Suggest additional treatment unit processes or options that can be added to the present waste treatment system at WMP to improve effluent quality and enable future expansion of WMP/
- LarWest Associates. 4/95-8/95. Design of a waste treatment system for a dairy plant producing cheese base by acid coagulation of reconstituted milk. The waste is high in sodium and chloride and thus is not a good candidate for land application. Without the land application option, there are challenges of providing an economical alternative for the dairy plant. Alternative being considered include anaerobic digestion, land application on soils irreparably damaged by salt; reverse osmosis followed by drying and landfilling and a lagoon system.

- Food and Agriculture Organization of the United Nations. 9/5/93-9/25/93. Upgrade on-going research programs of the Dairy Engineering Division by introducing into them biotechnological process alternatives, initiate a research program involving application of biotechnological process in the area of treatment of dairy plant waste waters, provide consultancy for setting up a DairyFood Plant Waste Water Laboratory, deliver seminars on biological treatment of DairyFood Plant Waste Waters, review and update the post graduate courses offered in dairy waste water treatment and submit a mission report as per attached guidelines.
- Auro Tech, Inc. 7/87-1993. Mission was to develop marketable technology from an idea for tenderizing and improving meat. A patent on the idea was issued to Deloy G. Hendricks and Conly Hansen in 1991. Duties include research and machine design.
- Magic Valley Milk Inc. 4/89-4/93. Analyze plant waste treatment system, help create a land application system and obtain a National Pollutant Discharge Elimination Permit for the plant.
- Sevier County Committee for Agriculture Improvement 6/87-9/87. Reviewed plans for new medium sized vegetable processing facility and completed preliminary design of a waste treatment system for the facility.
- Technical consultant for Inland Products Inc., a rendering company 7/85-12/86. Duties were to develop an improved waste management plan for the company. Plan development included a thorough audit of the plant and design of an upflow anaerobic sludge blanket digester (UASB). Designed a waste land application procedure for the firm. Equipment and system changes for the plant resulted in a 43% decrease (over \$15,000/mo) in sewer bills.
- **Heritage Consultants, Inc. 12/82-6/83.**

Project Engineer for energy audit of government owned housing. Assisted in proposal preparation and served as project officer for a staff of three engineers, two environmental scientists, and clerical help to audit 4,228 dwelling units in 16 projects. Over 50 energy conservation opportunities (ECO) including these involving solar energy and energy reclamation were considered for each project. The cost and simple payback for each applicable ECO was calculated. Project was funded through the Columbus Metropolitan Housing Authority.

Project Engineer for meat, poultry and dairy industry energy conservation study. Assisted in proposal preparation (\$46,000) and served as the project engineer for an energy study of small and medium sized meat, poultry, and dairy processing plants. Project engineer with a staff of two engineers and two technicians. Selected and visited 23 plants representative of the industry, and audited nine of those plants for energy usage. Over 25 significant energy conservation opportunities (ECO) were identified, alternative equipment or management strategies were

specified, and energy and money savings and payback calculated for each major ECO. Co-authored reports. Project was funded through the Ohio Department of Energy.

➤ **John Foster and Associates, 8/81-11/81**

Technical consultant for an energy audit of municipal sewage treatment plants. Performed an energy audit of tertiary sewage treatment plants treating a combined flow of over 100 million gallons per day of sewage. Duties included determining energy usage of unit processes, identifying energy conservation opportunities (ECO's), and specifying new methods and equipment that save energy and money. Co-authored report, "Energy Conservation Audit, Columbus Wastewater Treatment Facilities." Project funding was through the City of Columbus, Ohio.

Technical consultant for design of wastewater treatment systems for roadside rest areas. Sized and designed wastewater treatment systems for small, medium, and large roadside rest areas for Ohio Department of Transportation.

**DISCOVERIES/NEW PRODUCTS OR DESIGNS:**

- Cluster system", anaerobic digester system (Provisional patent 1999)
- Continuous anaerobic removal of ammonia (1998)
- Non contact injection/impregnation of meat with high pressure jets (patent, 1991).
- Reclamation of sodic soil using acid whey.
- Biological detoxification of mercury
- Development of improved bacterial strain for biological detoxification of Mercury
- Development of low/non-fat whipped topping
- Development of low/non-fat soft cheese
- Investigation of functional properties of dried and extruded, ultrafiltered and/or enzymatically altered dairy proteins
- Designed and equipped laboratory (1985-present)

**INTERNATIONAL PROJECTS:**

- **Australia**

Sabbatical (8-28-95 to 2-14-96) at Univ. of Melbourne, Dookie College Campus. The goals of this sabbatical were to collect and share information on dairy processing plant waste management systems with Australian dairy processing companies and to identify problems and discuss with them how they were going about solving their problems. It was also a goal to identify knowledge gaps which they or their consultants had not been able to determine and to recommend to the Australian Dairy Research and Development Corporation areas that need more funding support.

➤ **Egypt**

Presented seminars at Ain Shams University, Cairo, Egypt, expenses paid. March, 1994.

➤ **FAO Consultant**

Spent three weeks (9-5-93 to 9-25-93) at National Dairy Research Center in Karnal, India advising in the dairy waste utilization and management.

➤ **United States Environmental Protection Agency Conference on Mercury**

Made presentation and co-chaired break-out session on mercury detoxification at the U.S. Environmental Protection Agency's workshop on Mercury: Removal, Recovery, Treatment, and Disposal held in Alexandria, Virginia August 19-20, 1992. Two academicians were invited from US universities at USEPA's expense to make a presentation at the conference.

➤ **Presentations at ICEF Conferences**

Presentations at the 1985 (Canada), 1989 (Germany), 1993 (Japan), and 2004 (France) conferences of the International Congress on Engineering and Food.

➤ **Invitation to lecture in China**

Lectured two weeks at East China Institute of Chemical Technology in Shanghai and another week at Tsing Hua University in Beijing in May, 1988 on biological detoxification of hazardous waste in soil and water (emphasizing mercury) and food waste management. Lectured as a guest of the Peoples Republic of China

➤ **Biotechnology Committees of the American Society of Agricultural Engineers**

Chair of both the Biotechnology Executive and Biotechnology Advisory Committees of ASAE in 1994. These committees lead the biotechnology effort of ASAE.

➤ **External Examiner for Technical University of Nova Scotia**

Guest of TUNS and external Examiner for Ph.D. candidate, Emmanuel A. Echiegu's Thesis, Anaerobic digestion of dairy wastes, TUNS, September, 1991.

➤ **Channel System with Egypt**

The "Channel System" is a joint program established between the United States and Egypt wherein partners are involved. An Egyptian student is registered for a Ph.D. degree in an Egyptian university under the joint supervision of a foreign professor and Egyptian professor, specialized in the same field of research. The two professors work together to help the student. This program has been initiated between Dr. Hansen and Ain Shams Univ. in Egypt. Dr. Hansen will travel to Egypt twice during the students studies toward the Ph.D. degree to coordinate the project.

**TEACHING DOCUMENTATION:**

**Faculty evaluations by the students:**

Student ratings reflect a conscientious effort to teach and personal efforts to help students.

**Course objectives and Outlines:**

Course objectives are written for all courses.

**Instructional strategies:**

Lecture, demonstrations, discussion, special visual aids, laboratory exercises and field trips to food plants in Northern Utah are used in teaching food science and engineering students. Informal study-group help sessions are also given fall and winter terms. In addition to regular office hours, an open-door policy is used during certain times of the term or when students cannot meet during office hours.

**Graduate student committees:**

	Number <u>Completed</u>	Number <u>Current</u>
Doctoral Students (thesis advisor)	<u>5</u> <u>1</u>	<u>4</u> <u>          </u>
Masters Students Plan A	<u>21</u>	<u>1</u>
Masters Students Plan B (advisor)	<u>3</u>	<u>          </u>

Participated as a member of graduate student committees in the following departments since coming to Utah State University:

- Nutrition and Food Science
- Mechanical Engineering
- Civil and Environmental Engineering
- Chemistry
- Biological and Irrigation Engineering

**Degrees Awarded as Major Professor:**

- Ann Christy. M.S. 1985, Mathematical Model of the Biological Removal of Mercury
- Gregory T. West. Ph.D. 1988, Cogeneration of Methane and Microbial Protein From the Anaerobic Treatment of Rendering Waste
- Hong Jun Xu. M.S. (Plan B) 1990, A Full Scale UASB Plant Start-up Process and Performance Evaluation
- Shirley Ann Bond. MS 1991, Enzyme Hydrolyzed Retentate for Development of a Whipped Topping Mix
- Scott B. Jones. M.S. 1991, Sodic Soil Reclamation and Fate of Chemical Oxygen Demand From Cottage Cheese (Acid) Whey Application
- Shiying Zhang. M.S. 1992, Biological Detoxification of Mercury-Contaminated Soil
- Jonathan R. Maynes. Ph.D. 1992, A new Method for Measuring Macroparticulate Systems Applied to Measuring Syneresis of Renneted Milk Gels
- Seokhwon Hwang. M.S. 1993, Anaerobic Treatment of Whey Permeate Using Upflow Sludge Blanket (UASB) Bioreactors
- Sachin Singh. M.S. 1994, Functionality and Extrusion Performance of Skim Milk Proteins
- Sanjay Kalra. M.S. (Plan B) 1995, Pilot Plant Anaerobic Bioconversion of a Mixture of Cheese Waste and Manure
- Seokhwon Hwang. Ph.D. 1995, Bioprocess Models to Control Production of Short-chain Organic Acids from Cheese-processing Wastewater
- Mark Roginske. M.S. (Co-Major Professor) 1995, Land Application of Cheese Whey

Gurdeepak Singh Bakshi, MS 1997 Factors Affecting Moisture Movement in Low Fat Cheese  
Murtaza Goga, MS 1997 Twin-Screw Extrusion Performance of Nonfat Dry Milk and Cream in a Corn Flour-Based System.  
Ravi Dumpala MS 1997 (Plan B) Textural Properties of Aging Full Fat and Different Levels of Reduced Fat Cheddar Cheese.  
Subramanian Muralidharan, MS 1999 Studies on the Utilization of Deboned Trout (*Oncorhynchus Mykiss*) Frames in Fish Snack  
Marshall Smith, MS 1999 New Trout Product  
Kim Jaynes, MS 1999 Design of a Pilot Scale Anaerobic Digester and Straw Structure  
Yanguo Ma, PhD 2002 Modeling and optimization of a new anaerobic Digestion system for cheese whey wastewater treatment.  
Lina Alzate, MS 2003 (Plan B) Microprocessor Control of Cheese Injection  
Boyd Inglet, MS (2004) Mushroom Mycelia  
Brent Bingham, MS (2004) Production of Cellulases Using Food Processing Waste  
Shantana Wahal, MS (2004) Electronic Control of Meat Injection  
Dae-Yeol Cheong, PhD ( 2005) Sequencing Batch Reactors for Livestock Waste  
Mike Henrie MS (2005) Anaerobic Digestion of Wine Processing Waste  
Heath Hall MS (2006) Analysis of an Operating Anaerobic Digestion

#### Thesis Advisor

Reinbold, Robert S. PhD 1991, Factors Affecting Moisture Distribution in 290-Kilogram Stirred-curd Cheddar Cheese Blocks  
Robert's Major Professor retired from the University before Robert had graduated. Dr. Hansen assumed responsibilities for Robert's thesis and defense.

#### Partial Completion

Ravi Sankar V. Jonnalagedda, MS (1997-1999) High Pressure Injection of Beef  
John Eicholtz, MS (1996-1999) Food Processing Waste Treatment Options

#### **Degrees in Progress as Major Professor:**

Shaun Dustin, PhD (2009)  
Shantana Wahal, PhD (2009)  
Laura Jefferies Kahealani, PhD (2008) High Pressure Injection Technology  
Xiaojun (Jeffrey) Wu, PhD (2006) Mushroom Mycelia Bioreactive Compounds  
Reese Thompson MS (2008) Anaerobic production of Hydrogen using food processing waste

#### **Postdoctoral Fellows Sponsored:**

Gour Choudhury, Feb, 1987 - Sept, 1991  
Seokhwan Hwang, Aug, 1995 - Aug, 1996  
Buemsurk Kim, June, 1997 - May, 1998.

Dae-Yeol Cheong, July, 2005 - June, 2006.

**Visiting Scientists or Sabbaticals Sponsored:**

Min Kyune Song, PhD student at Pohang University of Science & Technology , Pohang, Korea.

Visiting Scientist, September - November, 2003

Jun Taek Lim, PhD student at Pohang University of Science & Technology , Pohang, Korea.

Visiting Scientist, January - March, 2003

Youngseob Yu, PhD student at Pohang University of Science & Technology , Pohang, Korea.

Visiting Scientist, July - October, 2001

Keunyoung Yang, PhD student at Pohang University of Science & Technology , Pohang, Korea.

Visiting Scientist, October- December, 2001

Jerzy Mrugalski, Head of Dialysis Unit, American Children's Hospital/Institute of Pediatrics, Krakow, Poland. Visiting scientist, March, 1987 - June, 1987.

Yehia El-Samragy, Professor, Ain Shams University Cairo, Egypt. Visiting professor, January 1991 to September, 1993, June to September, 1994 and July to September, 1996

Upendra Kachru, Delhi, India Businessman. Visiting scientist for 3 months in 1994.

Abdel Ghaly, Professor, Technical University of Nova Scotia. Visiting professor, April - Aug, 1995.

Roger Wrigley, Senior Lecturer, University of Melbourne-Dookie College. Visiting professor, October, 1996.

M. Altaf Khan, Director, Institute of Environmental Studies, University of Karachi, Karachi, Pakistan. Visiting Professor, January - March, 1997

Kumar Ashok Dodeja, Professor, National Dairy Research Institute, Karnal, India, September - December, 1998. Sponsored by the Food and Agriculture Organization of the United Nations.

B. K. Wadhwa, Professor, National Dairy Research Institute, Karnal, India, September - December, 1998. Sponsored by the Food and Agriculture Organization of the United Nations

**Reviewer for the Following Peer Reviewed Scientific Publications and Proposals:**

*Journal of Food Science*

*Transactions of The American Society of Agricultural Engineers*

*Applied Engineering in Agriculture*

*Bioresource Technology*

*Food Technology*

*U.S. SBIR*

*Processing/Value-Added, USDA/NRICGP*

*Maine Agricultural Experiment Station*

*Utah State Agricultural Experiment Station*

*Utah State University Faculty Proposals*

*United States Department of Agriculture  
Third Liquid Fuels and Industrial Products From Renewable Resources Conf. Papers  
Biotechnology Progress*

**PUBLICATIONS:** (3 books; two on byproduct utilization and one text)

**Books** (Three books on industrial waste management; four book chapters)

- Ockerman, H.W., C.L. Hansen. 2000. *Animal By-Product Processing and Utilization*, Technomics, Westport, CT, 523 ppg.
- Batty, J.C., C.L. Hansen, S.L. Folkman. 1999. *Food Engineering*. Used internally for Food Engineering classes at Utah State University.
- Ockerman, H.W., C.L. Hansen. 1988. *Animal By-Products Handbook*, Ellis Horwood, Chichester, England.

**Book Chapters** (4 chapters on waste and energy management)

- Hansen, C. L and D. Y. Cheong, 2006. Agricultural waste management in food processing. Invited for inclusion in Food Machinery Handbook. Edited by Myer Kutz, William Andrew Publishing Norwich, NY. In Press.
- Hansen, C. L and D. Y. Cheong, 2006. Fermentation, Biogas and Biohydrogen Production from Food Waste. Invited for inclusion in Waste Management and Co-product Recovery in Food Processing, Edited by Dr Keith Waldron, Institute of Food Research, UK, Woodhead Publishing Ltd, Abington Cambridge, UK.
- Hansen, C. L, S. Hwang, 2003. Waste treatment. Invited for inclusion in Environmentally-Friendly Food Processing, Edited by B. Mattsson and U. Sonesson, CRC Press LLC, Boca Raton, FL.
- Hansen, C.L 1992. Land Application of Paunch Manure and Blood. In: Inedible Meat By-Products, Volume 8, Edited by A.M. Pearson and T. R. Dutson, Elsevier Science Publishers LTD, London.

**Refereed Articles** (52 refereed articles)

- Wu, J. and C. L Hansen 2008. Antioxidant Capacity, Phenolic Content, and Polysaccharide Content of *Lentinus edodes* Grown in Whey Permeate-Based Submerged Culture. *J. of Food Science* Vol. 73, Nr. 1, M1-M8.
- Hansen, C.S., C.L Hansen. 2007. Using Biogas as a Fuel for Trucks (revised from paper presented earlier in Minneapolis). Refereed proceeding of Air Quality and Waste Management Symposium, ASABE.. 18 Sept. Broomfield, CO.
- Cheong, D.-Y., C. L Hansen. 2007. Effect of feeding strategy on the stability of anaerobic sequencing batch reactor responses to organic loading conditions. In Press, *Bioresource Technology*.

- Cheong, D.-Y., C. L Hansen. 2007. Feasibility of Hydrogen Production in Thermophilic Mixed Fermentation by Natural Anaerobes. *Bioresource Technology*. 98(11): 2229-2239.
- Cheong, D.-Y., C. L Hansen and D.K Stevens. 2007. Production of Bio-Hydrogen by Mesophilic Anaerobic Fermentation in an Acid-Phase Sequencing Batch Reactor. *Biotechnology and Bioengineering* Vol. 96, No. 3, 421-432.
- Wu, J. and C. L Hansen 2006. Effects of Whey Permeate Based Medium on the Chemical Properties of *Lentinus edodes* in the Submerged Culture. *J. of Food Science* 71: 174 - 179.
- Cheong, D.-Y., C. L Hansen. 2006. Acidogenesis characteristics of natural, mixed anaerobes converting carbohydrate-rich synthetic wastewater to hydrogen. *Process Biochemistry* 41:1736-1745.
- Cheong, D.-Y., C. L Hansen. 2006. Feasibility of Hydrogen Production from Anaerobic Mixed Fermentation. *Transactions of the American Society of Agricultural and Biological Engineers*. 49(2): 467-476.
- Cheong, D.-Y., C. L Hansen. 2006. Bacterial Stress Enrichment Induces Hydrogen Producing Anaerobes in Cattle Manure Sludge. *Applied Microbiology and Biotechnology*. 72(4): 635-643. DOI 10.1007/s00253-006-0313-x (on-line).
- Inglet, B. S., M. Song, C. L. Hansen and S. Hwang, 2006. Cultivation of *Lentinus edodes* Mycelia Using Whey Permeate As an Alternative Growth Substrate. *J. Dairy Science* 89(3): 1113-1115.
- Pastorino, A. J., C. L. Hansen, and D. J. McMahon. 2003. Effect of sodium citrate on the chemical composition and structure-function relationships of cheese. *J. Dairy Sci.* 86:3113-3121.
- Pastorino, A. J., C. L. Hansen, and D. J. McMahon. 2003. Effect of pH on the Chemical Composition and Structure-function Relationships of Cheese. *J. of Dairy Science* 86:2751-2760.
- Pastorino, A. J., C. L. Hansen, and D. J. McMahon, 2003. Effect of Salt on Structure-Function Relationships of Cheese. *J. of Dairy Science* 86:60-69.
- Pastorino, A. J., N. P. Ricks, C. L. Hansen, and D. J. McMahon, 2003. Effect of Calcium and Water Injection on Structure-Function Relationships of Cheese. *J. of Dairy Science* 86:105-113.
- Hansen, C. S. and C. L. Hansen 2002 "Demonstration of Dairy Manure Remediation Using IBR Technology," In *Proceedings of the Application of Waste Remediation Technologies to Agricultural Contamination of Water Resources Conference*, Edited by Wendy Griswold, Angie Burgoon, Larry E. Erickson, and Mary Rankin, Hazardous Substance Research

- Center, Kansas State University, Manhattan, Kansas, pp. 166-172. Also found at: [www.engg.ksu.edu/HSRC/ag/2002/abstracts/13Hansen.pdf](http://www.engg.ksu.edu/HSRC/ag/2002/abstracts/13Hansen.pdf).
- Youngseob Yu, C. L Hansen, and S. Hwang, 2002. Biokinetics in Acidogenesis of Highly Suspended Organic Wastewater by Adenosine 5' Triphosphate Analysis. *Biotechnology and Bioengineering*, 78(2):147-156.
- Junye J.I.A., Y. Kitamura, T. Fujiura, and C. L Hansen, 2000. Biogasification of Garbage Slurry by Methane Fermentation System (Part 1) - Characteristics of Acidogenic Process-. *Journal of The Japanese Society of Agricultural Machinery, Japan*, 62(5):43-49.
- Kitamura, Yutaka, C.L Hansen and N. Ishizuka, 1999. Anaerobic Gasification of Liquefied Okara. *Society of Agricultural Structures, Japan*, 30(3):31-36.
- Ricks, N.P., D. G. Hendricks, C.L Hansen, and R.V. Jonnalagedda, 1998. Effect of Tenderization Method on Microbial Load, Tenderization, and Thobabituric Acid Reactive Substances of Chicken and Beef. *The Journal of the Utah Academy of Sciences, Arts, and Letters*, 75:132-140.
- Kitamura, Yutaka, A. Tagawa, S. Nakao, and C.L Hansen, 1998. Liquefaction for Anaerobic Treatment of Soybean Meal. *Journal of The Society of Agricultural Structures, Japan*, 29(2):23-27
- Hwang, S. and C.L Hansen, 1998. Characterization and Bioproduction of Short-chain Organic Acids from Mixed Dairy-Processing Wastewater. *Transactions of the ASAE* 41(3):795-802.
- Hwang, S. and C.L Hansen, 1998. Evaluating a Correlation between Volatile Suspended Solid and Adenosine 5'-triphosphate in Anaerobic Treatment of High Organic Suspended Solids Wastewater. *Bioresource Technology* 63:243-250.
- Hwang, S. and C.L Hansen, 1997. Formation of Organic Acids and Ammonia during Acidogenesis of Trout-Processing Wastewater. *Transactions of the ASAE* 41(1):151-156.
- Hansen, C.L and R.J. Wrigley, 1997. Dairy Processing Waste Management in Australia. *Proceedings of International Congress on Engineering and Food 7*, Lewis Publishers, CRC Press Boca Raton, FL, USA.
- Hwang, S. and C.L Hansen, 1997. Modeling and Optimization in Anaerobic Bioconversion of Organic Wastewater to Acetic and Butyric Acids. *Biotechnology and Bioengineering* 54(5):451-460.
- Hwang, S. and C.L Hansen, 1997. Selective Measurement of Nonmicrobial Protein Wastewater by Use of Kjeldahl and Adenosine 5-triphosphate Analysis. *Transactions of the ASAE* 40(1):267-270.
- Robbins, C.W. and C.L Hansen 1997. Phosphorus Status of Calcareous and Sodic Soils Treated with Cheese Whey. *Transactions of the ASAE* 40(1):143-148.
- Robbins, C.W., C.L Hansen, M.F. Roginske and D.L. Sorensen 1996. Extractable Potassium and Soluble Calcium, Magnesium, Sodium, and Potassium in Two Whey Treated Calcareous Soils. *J. of Enviromental Quality* 25:791-795.
- Bullock, D.K., C.L Hansen and S.E. Poe. 1995. Carbon Monoxide Production from Whey Application. *Bioresource Technology* 54(3):231-233.
- Reinbold, R.S., C. M. Gale and C.L Hansen. 1994. Pressure During Pressing of 290-Kilogram Stirred-Curd Cheddar Cheese Blocks. *J. Dairy Science* 77:2865-2868.

- Lehrsch, G.A., C.W. Robbins and C.L Hansen. 1994. Cottage Cheese (Acid) Whey Effects on Sodic Soil Aggregate Stability. *Arid Soil Research and Rehabilitation*. 8:19-31.
- Reinbold, R.S., C. M. Gale and C.L Hansen. 1993. Pressure During Vacuum Treatment of 290-Kilogram Stirred-Curd Cheddar Cheese Blocks. *J. Dairy Science* 76:909-913.
- El-Samragy, Y.A. and C.L Hansen. 1993. A Method for Measuring the Water Holding Capacity of Milk Powders. *Food Control*. 4:141-143.
- El-Samragy, Y.A., C.L Hansen and D.J. McMahon. 1993. Production of Ultrafiltered Skim Milk Retentate Powder. I. Composition and Physical Properties. *J. Dairy Science* 76:388-392.
- El-Samragy, Y.A., C.L Hansen and D.J. McMahon. 1993. Production of Ultrafiltered Skim Milk Retentate Powder. 2. Functional Properties. *J. Dairy Science* 76:2886-2890.
- Hwang, S.H. and C.L Hansen 1993. Performance of Upflow Anaerobic sludge Blanket (UASB) Reactor Treating Whey Permeate. *Transactions of the American Society of Agricultural Engineers* 35(5): 1665-1671.
- Jones, S.B., C. W. Robbins and C.L Hansen. 1993 Sodic Soil Reclamation Using Cottage Cheese (Acid) Whey. *Arid Soil Research and Rehabilitation* 7:51-61.
- Jones, S.B., C.L Hansen and C. W. Robbins. 1993 Fate of Chemical Oxygen Demand from Cottage Cheese (Acid) Whey Applied to a Sodic Soil. *Arid Soil Research and Rehabilitation* 7:71-78.
- Reinbold, R.S., C.A. Ernstrom and C.L Hansen. 1993. Pressure and Temperature During Vacuum Treatment of 290-kilogram Stirred-curd Cheddar Cheese Blocks. *J. Dairy Science*. 76:909-913.
- Hansen, C.L and G.T. West. 1992. Anaerobic Digestion of Rendering Waste in an Upflow Anaerobic Sludge Blanket Digester. *Bioresource Technology* 41:181-185.
- Hansen, C.L, D.K. Stevens, S. Zhang and D.N. Warner. 1992. Biologically Enhanced Removal of Mercury From Contaminated Soil. Paper # 92-25.03. *Air & Waste Management Association*, Pittsburgh, PA 15230
- Hwang, S.H., C.L Hansen and D.K. Stevens. 1992. Biokinetics of Upflow Anaerobic Sludge Blanket Reactor Treating Whey Permeate. *Bioresource Technology* 41:223-230.
- Reinbold, R.S., C.A. Ernstrom and C.L Hansen. 1992. Temperature, pH, and Moisture Profiles During Cooling of 290-kg Stirred-Curd Cheddar Cheese Blocks. *J. Dairy Science* 75:2071-2082.
- Reinbold, R.S., C.A. Ernstrom and C.L Hansen. 1992. Effect of Container Materials on Temperature Profiles During Cooling of 66-kg Swiss and 290-kg Stirred-curd Cheddar Cheese Blocks. *J. Dairy Science* 75:2637-2647.
- El-Samragy, Y.A., C.L Hansen and D.J. McMahon. 1992. Production of Ultrafiltered Skim Milk Retentate Powder. I. Composition and Physical Properties. *J. Dairy Science* 76(2):388
- Choudhury, G.S. and C.L Hansen. 1988. Cadmium Effect on Biological Removal of Mercury. *Proceedings of the 81st Annual Meeting of APCA Dallas, TX June 1988*.
- Ritter, W.F., C.L Hansen and C.J. Clanton. 1987. Handling Food Process Waste. *Agricultural Engineering* 69:8-9.

- Williams, J.W., C.L Hansen and A. Jantrania. 1985. The Biological Removal of Mercury from Waste. Proceedings of the First International Conf. on New Frontiers for Hazardous Waste Management. Pittsburgh, PA. pg. 459.
- Christy, A., V. George and C.L Hansen. 1985. Mathematical Model of the Biological Removal of Mercury. In "Food Engineering and Process Applications" (Le Maquer, M and Jolen, P. Eds.). Elsevier Applied Science Publishers, New York.
- Hansen, C.L, G. Zwolinski, D. Martin and J.W. Williams. 1984. Bacterial Removal of Mercury from Sewage. Biotechnology and Bioengineering Journal. Vol. 26, p. 1330-1334.
- Hansen, C.L, R.K. White and M. Okos. 1984. Optimization of Water Management and Associated Energy in a Meat Packing Plant. Transactions of the Am. Soc. of Ag. Engr. 27(1):305-319.
- Hansen, C.L 1983. Methods for Animal Waste Recovery and Energy Conservation. Food Technology, 37(2):77-80, 84.

**Patents** (2 on high pressure injection; 3 granted & 2 pending on sustainable energy)

- Hansen, C.S., Hansen, C. L. 2007. Upflow Bioreactor Having a Septum and an Auger and Drive Assembly. Pending
- Hansen, C. L., Hansen, C. S., Watts, E. D., Pack, K. D. 2006. Continuation in part on the original patent (6,911,149). U. S. Patent 20060065593.
- Hansen, C.L and C.S. Hansen. 2005. Induced Sludge Bed Anaerobic Reactor, U.S. Patent #6,911,149.
- Hansen, C.L and E. D. Watts. 2004. Machine for Injecting Liquids. U.S. Patent #6,763,760 B2.
- Hendricks, D.G. and C.L Hansen. 1991. Method for tenderizing and upgrading the sensory qualities of red meat. U.S. Patent (1991) #5,053,237, and Canadian Patent (1993) #1314429.
- Pending/in preparation:
- Hansen, C.L and D.Y. Cheong. 2006. Methods for Manufacturing Hydrogen Using Anaerobic Digestion. Serial No: 60/693,710, Filed: June 24, 2005, Workman/Nydegger file no 16325.1. Patent pending.
- Hansen, C.L., Wood, B., Hansen, C.S. 2007. Bioreactor with solar input. Prepared April 2007.

**Papers Presented at Professional Meeting** (53 conference proceedings papers)

- Hansen, C. S., C. L Hansen, and G. Sullivan, 2007. Using Biogas as a Fuel for Trucks. Paper number: 074145. Presented at the ASABE Annual International Meeting, 17 - 20 June, Minneapolis Convention Center, Minneapolis, Minnesota. ASABE 2950 Niles Road, St. Joseph, MI 49085-9659.
- C. L Hansen; P. Zemke, D. Dye, C.S. Hansen, and S. Wahal. 2007. Utilization of the nutrients from an anaerobic digester treating animal waste. Paper number: 077013. Presented at the ASABE Annual International Meeting, 17 - 20 June, Minneapolis Convention Center, Minneapolis, Minnesota. ASABE 2950 Niles Road, St. Joseph, MI 49085-9659.
- Rosentrater, K. A., C. L Hansen and H. R. Hall. 2006. Anaerobic Digestion Potential for Ethanol Processing Residues. Paper Number: 066167. Presented at the ASABE Annual

- International Meeting, 9 - 12 July, Oregon Convention Center, Portland, Oregon. ASABE 2950 Niles Road, St. Joseph, MI 49085-9659
- Hall, H.R. and C.L Hansen. 2006. Changes in Settling Characteristics and Fate of Solids in Dairy Manure Using Anaerobic Digestion, Mechanical Liquid-Solid Separation, and Electrocoagulation. Paper Number: 064147. Presented at the ASABE Annual International Meeting, 9 - 12 July, Oregon Convention Center, Portland, Oregon. ASABE 2950 Niles Road, St. Joseph, MI 49085-9659.
- Hansen, C.S. and C.L Hansen. 2006. Cost Effective Anaerobic Digestion for Treating Manure and Food Waste. Paper Number: 067068. Presented at the ASABE Annual International Meeting, 9 - 12 July, Oregon Convention Center, Portland, Oregon. ASABE 2950 Niles Road, St. Joseph, MI 49085-9659.
- Hansen, C.S., C.L Hansen and J.D. Hansen. 2006. Anaerobic Digestion: Failed Process or Futuristic Technology for Agricultural?, Presented at American Farm Bureau Federation, Meet the Researchers Poster Paper display, Jan 9, Nashville, TN. Also posted at <http://www.fb.org/posters/nashville.pdf>.
- Hansen, C.L. 2006 What to do with lactose - produce energy? ADSA International meeting, Minneapolis, Minnesota, July 10, 2006. Invited.
- Cheong, D.-Y. and C.L Hansen. 2005. Acidogenesis Characteristics of Mixed Anaerobes Converting Carbohydrate-Rich Organic Wastewater to Hydrogen. Paper Number 056017. Presented at the ASAE Annual Meeting, July 17-20, Tampa, FL. ASAE, 2950 Niles Road, St. Joseph, MI 49085-9659.
- Mann, S. L., C. L Hansen, and C. S. Hansen. 2004. Anaerobic Digestion and Bio-gas. Paper Number: 04408. Presented at the ASAE Annual Meeting, August 1-4, Ottawa, Canada. ASAE, 2950 Niles Road, St. Joseph, MI 49085-9659.
- Hansen, C.L, and E. D. Watts. 2004. High pressure injection A new technology for tenderizing and flavoring food. Proceedings of the Ninth International Congress on Engineering and Food, Montpellier, France March 7-11.
- Cheong, D.-Y., C. L Hansen, and J. Lim. 2003. Anaerobic Hydrogen Production in a Batch Reactor Using a Mixed Culture at Mesophilic and Thermophilic Temperatures. Paper # 036174, ASAE Annual Meeting, July 28-31, Las Vegas, NV. ASAE, 2950 Niles Road, St. Joseph, MI.
- Cheong, D.-Y., and C. L. Hansen. 2003. Performance of Anaerobic Sequencing Batch Reactors for Treating Organic Wastewater Containing High Nitrogen And Phosphorous. Paper # 036175, ASAE Annual Meeting, July 28-31, Las Vegas, NV. ASAE, 2950 Niles Road, St. Joseph, MI.
- Hansen, C.L, and C.S. Hansen. 2003. IBR Digester Example- Swine Waste, Proceedings of the Anaerobic Treatment of Animal Wastes Workshop, Gaylord Opryland Hotel, Nashville, Tennessee November 3 - 5.
- Hansen, C.L, and C.S. Hansen. 2003. Demonstration of the Induced Blanket Reactor for Anaerobic Treatment of Dairy and Swine Manure, Proceedings of the Anaerobic Digester Technology Applications in Animal Agriculture Summit, Hilton North Hotel, Raleigh, NC, June 2-4.

- Hansen, C.L, N.P. Ricks, D.G. Hendricks, and E. D. Watts. 2002. High Pressure Injection Technology-Microbial Loads & Tenderization Compared to Needle Injection. Japanese Society of Structural Engineers (SASJ) Annual Conference, August 28-29, Matsue, Japan.
- Hansen, C.L and C.S. Hansen. 2002. Anaerobic Toxicity Assay (ATA) and Cation Inhibition (CI) For Cheese-Processing Waste. Paper # 026055, Presented at the ASAE Annual Meeting, July 29-31, Chicago, IL. ASAE, 2950 Niles Road, St. Joseph, MI 49085-9659.
- Hansen, C.L and C.S. Hansen. 2000. Effectiveness of Drum Composter Treating Food Processing Wastes. Paper # 006125, Presented at the ASAE Annual Meeting, July 9-12, Milwaukee, Wisconsin. ASAE, 2950 Niles Road, St. Joseph, MI 49085-9659.
- Hansen, C.L and S. Cornia. 2000. Improved Methane Production in an Anaerobic System Using a Methanogenic Upflow Anaerobic Sludge Blanket. Paper # 006124, Presented at the ASAE Annual Meeting, July 9-12, Milwaukee, Wisconsin. ASAE, 2950 Niles Road, St. Joseph, MI 49085-9659.
- Hansen, C.L and Z.A. Yates. 1999. Continuous Anaerobic Treatment of Very High Strength Organic Waste. 54<sup>th</sup> Annual Pacific Northwest Regional Conference of ASAE/CSAE, Sherwood Hills Resort, Logan, UT. September 23-25, 1999.
- Hansen, C.L, B. Maxfield. 1999. Effectiveness of Drum Composter Treating Dairy Wastes. Paper # 996078, Presented at the ASAE Annual Meeting, July 17-21, Toronto, Alberta, Canada. ASAE, 2950 Niles Road, St. Joseph, MI 49085-9659.
- Yates, Z.A., C.L Hansen, and N. Maxfield. 1999. Anaerobic System for High-strength Organic Waste. Paper # 996075, Presented at the ASAE Annual Meeting, July 17-21, Toronto, Alberta, Canada. ASAE, 2950 Niles Road, St. Joseph, MI 49085-9659.
- Hansen, C.L 1998. Dairy Processing Waste Management Practices in South Eastern Australia. Presented at the 13<sup>th</sup> Biennial Cheese Conference, August 10-12, 1998, Utah State University, Logan, UT.
- Berge, J. S. and C.L Hansen. 1998. Anaerobic Ammonia Removal. Am. Soc. of Ag. Engr Paper # 987042, presented at the ASAE Annual Meeting, July 12-16, Orlando, FL. ASAE, 2950 Niles Road, St. Joseph, MI 49085-9659.
- Hansen, C.L and J.S. Berge. 1998. Volatile Organic Acid Production from High Strength Wastes. Am. Soc. of Ag. Engr Paper # 986111, presented at the ASAE Annual Meeting, July 12-16, 1998, Orlando, FL. ASAE, 2950 Niles Road, St. Joseph, MI 49085-9659.
- Kitamura, Y., S., Nakao, A. Tagawa and C.L Hansen. 1997. Liquefaction Process for Utilizing Soybean Processing Byproduct. Presented at the Sustainable Agricultural and Food Systems 1997 Fall Overseas Symposium of the Japanese Society of Agricultural Structures, September 29 - October 7, Honolulu, Hawaii.
- Goga, M., C.L Hansen, and S. H. Hwang. 1997. Twin Screw Extrusion Performance of Nonfat Dry Milk and Cream in a Corn Flour-Based System. Am. Soc. of Ag. Engr. Paper # 976008, presented at the ASAE Annual Meeting, August 10-14, Minneapolis, MN. ASAE, 2950 Niles Road, St. Joseph, MI 49085-9659.
- Hwang, S.H. and C.L Hansen. 1997. Bioconversion of Trout-Processing Wastewater to Short-Chain Organic Acids: Two-Phase Anaerobic Process. Am. Soc. of Ag. Engr. Paper # 976048, presented at the ASAE Annual Meeting, August 10-14, Minneapolis, MN. ASAE, 2950 Niles Road, St. Joseph, MI 49085-9659

- Jaynes, K., C.L Hansen and S.H. Hwang. 1997. Straw Building for Housing Anaerobic Digester. Am. Soc. of Ag. Engr. Paper # 976049, presented at the ASAE Annual Meeting, August 10-14, Minneapolis, MN. ASAE, 2950 Niles Road, St. Joseph, MI 49085-9659.
- Hansen, C.L 1996. A review of waste management practices at selected dairy processing plants in South Eastern Australia. Keynote address at Australian Dairy Research and Development Corporation Seminar on Dairy Waste Practices in Australia. February 9, Monash University, Melbourne, Australia.
- Bakshi, G.S., C.L Hansen and J.A. Torres. 1995. Identification of mechanisms responsible for moisture variability in reduced fat Cheddar cheese. Annual Meeting of the Institute of Food Technologists, June 3-7, Anaheim, CA.
- Hansen, C.L and S. H. Hwang. 1994. Anaerobic Digestion of Mixed Agricultural Waste in a Pilot Scale Reactor. Am. Soc. of Ag. Engr. Paper # 94-6537, presented at the ASAE Winter Meeting, December 13-16, Atlanta, GA. ASAE, 2950 Niles Road, St. Joseph, MI 49085-9659.
- Bakshi, G.S. and C.L Hansen. 1994. Temperature, Curd Treatment and Time Effects on the Interaction of Water with the Protein Fat Matrix of Reduced Fat Cheddar Cheese. Am. Soc. of Ag. Engr. Paper # 94-108, presented at the 1994 Pacific Northwest Meeting. Sponsored by ASAE, Sept. 14-16, Utah State University, Logan, UT.
- Hwang, S.H. and C.L Hansen. 1994. Production of Bioenergy from Industrial Wastewater: Biological Process Control. Am. Soc. of Ag. Engr. Paper # 94-106, presented at the 1994 Pacific Northwest Meeting. Sponsored by ASAE, Sept. 14-16, Utah State University, Logan, UT.
- Ghosh, S., K. Fukushi, T.Liu, S. Kalra, C. Mariger, C. L Hansen, L. Debirk, S. Bupp, J. Christensen, S. Sargent and R. Millar. 1994. Pilot Plant for Biomethanation of Dairy-Industry Wastes. Proceedings of the 6<sup>th</sup> National Bioenergy Conference, October 2-6, Sparks, NV.
- Hansen, C.L Hansen. 1994. Utilization of Cheese Wastes. Proceedings of the 11<sup>th</sup> Biannual Cheese Conference, Utah State University, August 16-18, Logan, UT.
- Hwang, S.H. and C.L Hansen. 1993. Batch Mode Multiphase Anaerobic Process to Treat High Strength Organic Waste. Am. Soc. of Ag. Engr. Paper # 93-6520, presented at the ASAE Winter Meeting, December 15-18, Chicago, IL. ASAE, 2950 Niles Road, St. Joseph, MI 49085-9659.
- Hansen, C.L S.H. Hwang and D.N. Warner. 1993. Two Stage Controlled Anaerobic Bio-reactor for Digesting Mixed Dairy Waste. Proceedings of the Sixth International Congress on Engineering and Food, May 23-27, 1993. Makuhari Messe, Chiba, Japan
- Hansen, C.L and S.H. Hwang. 1992. Two Stage Anaerobic Digestion of Cheese Processing Waste. Am. Soc. of Ag. Engr. Paper # 92-6605, presented at the ASAE Winter Meeting, December 15-18, Nashville, TN. ASAE, 2950 Niles Road, St. Joseph, MI 49085-9659.
- Hansen, C.L, D.K. Stevens, S. Zhang and D.N. Warner. 1992 Effect of Environmental Variables on Removal of Mercury by Mercury Resistant Bacteria. Presented at the Conference on Hazardous Waste Research, June 1-2, Boulder, CO.

- Johnson, B. and C.L Hansen. 1991. Characterization of Swiss Cheese Plant Centrifuge Sludge, Buttermilk and Press Whey for Digestion in a Two Stage Anaerobic Reactor. Am. Soc. of Ag. Engr. Paper # 91-6580, presented at the ASAE Winter Meeting, December 17-20, Chicago, IL. ASAE, 2950 Niles Road, St. Joseph, MI 49085-9659.
- Zhang, S. and C.L Hansen. 1991. Biological Detoxification of Mercury Contaminated Soil. Am. Soc. of Ag. Engr. Paper # 91-6006, presented at the ASAE Summer Meeting June 23-26, Albuquerque, N. Mexico.
- Hwang, S. H. and C.L Hansen. 1990. Use of Upflow Anaerobic Sludge Blanket (UASB) Reactor to Treat Whey Permeate. Proceedings of the Sixth International Symposium on Agricultural and Food Processing Wastes. December 17-18. Chicago, Illinois.
- Hansen, C.L, D.K. Stevens, D.N. Warner and G.S. Choudhury 1990. Effect of Aeration Rate, and Hydraulic Retention Time on Partitioning of Biologically Reduced Mercury. Proceedings of the 1990 Conference on Hazardous Waste Research. May 21-22. Manhattan, Kansas.
- Hansen, C.L and G.S. Choudhury. 1989. Biological Treatment of Mercury Waste. Proceedings of the Metal Waste Management Alternatives: Minimizing, Recycling, and Treating Hazardous Metal Wastes Sept. 12-13, Pasadena, CA.
- Choudhury G.S., C.L Hansen, Y. Bian and R. Dupont. 1989. Conditioning of Whey Permeate for Methane and Biomass Production. Proceedings of the Fifth International Congress on Engineering and Food, May 28-June 3, 1989. Cologne, Germany.
- Hansen, C.L and H.J. Xu. 1988. Metals Detoxification Using Whey Permeate. Proceedings of the 8th Biennial Cheese Industry Conference Aug 23-25, 1988. Logan, UT.
- Xu, H.J., C.L Hansen and G.S. Choudhury. 1987. Using Dairy Byproduct for Mercury Waste Detoxification. Proceedings of the Food Processing Waste Conference Sept. 1-2, Atlanta, GA.
- Hansen, C.L and G.T. West. 1986. Low Cost Wastewater Treatment. Proceedings of the 1986 Utah State University Cheese Conf. Aug. 26-28. USU, Logan, UT.
- Hansen, C.L 1986. Biological Removal of Mercury From Water and Sludges. Proceeding of the Hazpro '86, Baltimore, MD. pp 500-506.
- Hansen, C.L and G. West. 1986. Cogeneration of Biogas and Single Cell Protein From Meat Processing Wastes. Am. Soc. of Ag. Engr. Paper # 86-6561 presented at the ASAE Winter Mtgs., Chicago, IL. ASAE, 2950 Niles Road, St. Joseph, MI 49085-9659.
- Shaver, E.M., C.L Hansen and R.K. White. 1985. The Patho-Biology of Heavy Metal Toxicity in Livestock and Its Implication in the Land Application of Sludges. Proceedings of the Fifth Intl. Symp. on Ag. Wastes, Dec 16-17. Chicago, IL. .
- Hansen, C.L and V. George. 1983. Recovering and Upgrading By-Products with Associated Energy Conservation. Am. Soc. of Ag. Engr. Paper #83-6543, presented at the ASAE Winter Meeting, Chicago, IL. ASAE, 2950 Niles Road, St. Joseph, MI 49085-9659.
- Hansen, C.L, E.L. Fields and R.C. Huff. 1983. Energy Conservation in Small Meat, Poultry and Dairy Processing Plant. Am. Soc. of Ag. Engr. paper #83-6002, presented at the Summer Meeting, Bozemen, MT. Chosen by ASAE as one of the "Technical Highlight" papers. By request, significant portions of this manuscript were included in an energy conservation handbook prepared by Bret Kronhom.

- Hansen, C.L, R.K. White and W.F. Lyon. 1981. Fly Control with Manure Management in Ohio. Paper #81-4574 presented at Am. Soc. of Ag. Engr. Winter Meeting, Chicago, IL. ASAE, 2950 Niles Road, St. Joseph, MI 49085-9659.
- Hansen, C.L, R.L. White and M. Okos. 1980. Optimization of Water Management and Associated Energy in the Meat Packing Industry. Am. Soc. of Ag. Engr. Paper #80-6006, presented at the Summer Meeting, San Antonio, TX. ASAE, 2950 Niles Road, St. Joseph, MI 49085-9659.

### **Video Presentation**

- Berge, J. S. and C.L Hansen. 1998. Anaerobic Ammonia Removal Process. Padnos Prize competition, Omni Hotel at CNN Center, Atlanta, GA. August 13-14, 1998.
- Watts, E. D and C.L Hansen. 2004. IBR Anaerobic Digester. Ten minute DVD used to transfer technology developed at USU.
- Hansen, C.L and E.D. Watts. 2003. High Pressure Injector. Ten minute DVD used to transfer technology developed at USU.

### **Poster Sessions (13 posters)**

- Wu J, and C. L Hansen 2006. Effects of Whey Permeate Based Medium on the Proximate Composition of *Lentinus edodes* in the Submerged Culture. Presented at Institute of Food Technologists Annual Meeting, June 25-29, New Orleans, LA. Presentation Number: 003A-32.
- Hansen, C.L and J.D. Hansen. 2004. Renewable Energy From Biomass. Presented at the Utah State Capital, Farm Bureau Day, February 12. Salt Lake City, UT.
- Hansen, C.L and J.D. Hansen. 2004. Induced Blanket Reactor and High Pressure Injection Technology. Presented at the American Farm Bureau Federation Annual Meeting, January, 10-11. Honolulu, HA.
- Cornia, S. and C.L Hansen. 2000. Two Stage Anaerobic Digestion System To Treat Dairy Waste with Short Hydraulic Retention Times. Presented at the Institute of Biological Engineering, 2000 Conference, Oct 11-12, Seattle, WA.
- El-Samragy, Yehia and C. L Hansen. 1995. Characteristics of a New Low Fat, Dairy Whipped Topping. Presented at the 90th American Dairy Science Association Meeting, June 27-30, Ithaca, NY.
- El-Samragy, Yehia and C. L Hansen. 1994. Sensory Characteristics, Physical Properties and Composition of a New, High Protein, Low Fat, Fermented Dairy Food. Presented at the 89th American Dairy Science Association Meeting, July 11-14, Minneapolis, MN.
- Hansen, C.L and S. Singh. 1994. Extrusion of skim milk protein. Presented at Institute of Food Technologists Annual Meeting, June 26-29, Atlanta, Georgia.
- Hansen, C.L 1993. Characterization and Utilization of Cheese Processing Waste. Presented at the Third Conference of Food Engineering, American Institute of Chemical Engineers, Feb. 21-23, Chicago, Illinois.

- El-Samragy, Y.A., C.L Hansen and D.J. McMahon. 1992. Production of Ultrafiltered Skim Milk Retentate Powder, 2. Functional Properties. Presented at International Food Technology Exposition and Conference, November 15-18, The Hague, The Netherlands.
- Jones, S.B., C. W. Robbins and C.L Hansen. 1992 Sodic Soil Reclamation Using Cottage Cheese (acid) Whey. Presented at the ASAE Winter Meeting, December 15-18, Nashville, TN.
- Jones, S.B., C.L Hansen and C. W. Robbins. 1992 Cottage Cheese Whey Chemical Oxygen Demand Fate in Lysimeter Soil. Presented at the ASAE Winter Meeting, December 15-18, Nashville, TN.
- Maynes, J.R. and C.L Hansen. 1992. A New Method of Measuring Syneresis of Renneted Milk Gels. Presented at Institute of Food Technologists Annual Meeting, New Orleans, LA, June 20-24, 1992.
- Hansen, C.L, Choudhury, G.S. and Warner, D.N. 1990. Biological and Physio-Chemical Remediation of Mercury Contaminated Hazardous Waste. 16th Annual EPA Research Symposium April 3-5 Cincinnati, OH.

**Abstracts (32 abstracts)**

- Cheong, D.Y., C. S. Hansen, and C. L Hansen, 2006. Cost Effective Anaerobic Digestion for Treating Manure and Food Waste. Abstract number: 066162. Presented at the ASABE Annual International Meeting, 9 - 12 July, Oregon Convention Center, Portland, Oregon. ASABE 2950 Niles Road, St. Joseph, MI 49085-9659.
- Hansen, CL, 2006. Anaerobic Digestion for Farmers. Presented February 15, at World Ag Expo, Tulare, California. Invited
- Hansen, CL, 2005. Anaerobic Digestion: Antiquated Process or Futuristic Technology to Utilize Biomass? Presented September 12, Dalhousie University, Halifax, Nova Scotia, Canada. Invited
- Watts, E. D. and C.L Hansen, 2005. Potential for Anaerobic Digestion in West Central Wisconsin. Presented June 16, Westby, WI. Invited.
- Hansen, C.L, 2005. Anaerobic Digestion: Pollution Controller, Energy Generator or Management Nightmare. National Resource Conservation Service National Agronomist Conference. June 7-8, Federal Building, Salt Lake City, UT. Invited.
- Hansen, C.L, 2005. Anaerobic digestion with Nutrient Removal. Farm Pilot Plant Coordination, Inc. Symposium May 4 - 6, Vinoy Resort, St. Petersburg. FL. Invited
- Hansen, C.L, 2005. Commercialization of Induced Blanket Digester. Presentation and panelist for seminar sponsored by Technology Commercialization Office for USU research week April 15, Eccles Conference Center, USU, Logan, UT. Invited.
- Hansen, C.L, 2005. Anaerobic Digester: Turning waste into Electricity. Renewable Energy Conference, April 5, Wasatch County Library, 465 E. 1200 South, Heber City, Utah. Invited.
- Hansen, C. L. 2004. Collaborative Midwest Center To Demonstrate Agriculture Waste Treatment Technology At Pilot Or Full Scale. Feasibility Study Presentation for USEPA,

- USDA, and Colorado Department of Environmental Quality. Nov 30. Teague Diversified, Ft Morgan, CO.
- Hansen, C.L. 2004. Anaerobic Digestion of Agricultural Wastes in Eastern Colorado. 2004 Byproducts Beneficial Use Summit, Nov 8-9, Westin Crown Center, Kansas City, MO.
- Hansen, C.L. 2004. Biomass Renewables. Bioneers Conference, Oct 15-17, Utah State University, Logan, UT.
- Hansen, C.L. 2004. Bioproducts. Horizons Conference, Oct 11-13, University of Utah, Salt Lake City, UT.
- Cheong, D.-Y. and C. L. Hansen. 2004. Enhanced production of bio-hydrogen from glucose by acid-phase anaerobic sequencing batch reactor. Presentation # 046141, ASAE Annual Meeting, August 1-4, Ottawa, ON. ASAE, 2950 Niles Road, St. Joseph, MI.
- Hansen, C.L, C.S. Hansen, E. D. Watts, and K. Pack. 2004. IBR Digester for Swine Waste. Utah Resource Conservation & Development Association Annual Meeting, April 21-23, Yarrow Hotel, Park City, UT.
- Pastorino, A. J., C. L Hansen, D. J. McMahon. 2002. Effect of pH on Chemical and Functional Properties of Cheese. ADSA/ASAS Joint Annual Meeting, July 21-25, Quebec City, Quebec, Canada.
- Pastorino, A. J., C. L Hansen, D. J. McMahon. 2002. Effect of salt on structure-function relationships of cheese. 2002 IFT Annual Meeting, June 17-19, Anaheim, CA.
- Ma, Y. and C.L Hansen. 2002. Analysis of biochemical methane potential (BMP) and specific methane activity (SMA) for cheese processing waste. 2002 IFT Annual Meeting, June 17-19, Anaheim, CA.
- Hansen, C.L 2001 Volatile Organic Acid Production and Removal in a Two Stage Anaerobic Digester. 11th World Congress of Food Science & Technology, April 22-27, 2001, Seoul, Korea.
- Pastorino, A.J., N.P. Ricks, C. Hansen, and D.J. McMahon. 2000. Effect of water and calcium injection on structure-function attributes of Mozzarella cheese. 2000 IFT Annual Meeting Book of Abstracts: 86.
- Hansen, C.L 1999. Commercializing New Technology in Meat, Fish and Poultry Processing. WCC 107 Conference, Using Public Sector Resources to Develop Food Export Opportunities, March 2, Holiday Inn Portland Airport, Portland, OR.
- Hansen, C.L 1996. Report of Sabbatical to the Faculty and Staff of Dookie College. Feb 8, Dookie College, Victoria, Australia.
- Hansen, C.L 1995. Waste Management into the Twentieth Century. Invited speaker to South Victoria (Australia) Dairy Association Meeting. Nov. 15, Warrnambool, Victoria, Australia.
- Hansen, C.L 1994. How Collaboration Has Helped Nutrition and Food Science and Biological and Irrigation Engineering. Keynote address at ASAE Pacific Northwest Section meeting. Sept. 15, Logan, UT
- Hwang, S.H. and C.L Hansen. 1993. Development of Two-Phase Anaerobic Process to Treat High Strength Organic Waste and Produce Energy. Presented at the International Conference for Agricultural Machinery and Process Engineering (ICAMPE '93), October 19-22, Seoul, Korea

- Bond, S. and C.L Hansen. 1991. Enzyme Hydrolyzed Retentate for the Development of a Whipped Topping Mix. Presented at the American Dairy Science Association Meeting, June 20-23, Logan, UT
- Hansen, C.L 1991. The Role of Environmental Research in Biological Engineering. Key note address for session on waste management. Presented at Am. Soc. of Ag. Engr. Summer Meeting, June 23-26, Albuquerque, NM
- Choudhury, G.S., C.L Hansen and D.K. Stevens. 1991. Biokinetics of Mercury Removal From Polluted Water. Presented at the 17th Annual EPA Research Symposium April 9-11 Cincinnati, OH.
- Hansen, C.L, G.S. Choudhury and Y. Bian. 1989. Anaerobic digestion of whey permeate in an upflow anaerobic sludge blanket digester. Presented at American Dairy Science Assoc. and American Society of Animal science joint meeting, July 31-Aug 4, Lexington, KY.
- Hansen, C.L 1988. Energy: Conservation, Usage and Recovery in the Food Industry. Presented at Nineteenth Annual Symposium on Food Science, sponsored by: Institute of Food Technologists, Intermountain Section, March 10-11. Sun Valley, ID.
- Tuovinen, O.H. and C.L Hansen. 1986. Microbial Technology for Metals. International Conference on Innovative Biological Treatment of Toxic Wastewaters. Arlington, Va. June. .
- Hansen, C.L 1985. Energy Conservation Techniques in Food Processing. Ohio State University Dairy and Food Industry Conference, Feb. 13-14, Columbus, OH.
- Hansen, C.L 1986. Wood Biofuels and Solid Waste. Utah Education Renewable Energy Resource Conference. Nov. 1986. Salt Lake City, UT.

### **Symposia and Short-Courses (18 symposia)**

- Hansen, C.L 2001. Preparation for the Professional Engineering Examination-Biological Engineering. Presented at the ASAE Annual Meeting, July 28-August 1. Sacramento, CA.
- Hansen, C.L 2001 Waste Management Research in the Center For Profitable Uses of Agricultural Byproducts. Presented at Pohang University of Science & Technology (POSTECH), April 23, Pohang, Korea.
- Hansen, C.L 2000. Anaerobic and Aerobic Systems for Treating Animal Waste. Presented to the Utah State Advisory Council on Science and Technology, Sept 5, Salt Lake City, UT
- Hansen, C.L 1999. Emergency preparedness - Sanitation and Water Purification. Presented to a community group of women (60 in attendance), Jan 14, 1999, North Logan, UT.
- Hansen, C.L 1998. How to Prepare for the Professional Engineering Examination in Biological Engineering. Presented at the ASAE Annual Meeting, July 12-16, 1998, Orlando, FL.
- Hansen, C.L 1995. Emergency preparedness - sanitation. Presentation and paper prepared for community emergency preparedness seminar, April 19, 1995, North Logan, UT.
- Hansen, C.L 1993. Whey utilization. Proceedings of the 1993 Cheese Making Short Course. Feb 21-24, USU, Logan, UT.
- Hansen, C.L 1992. Biological and Physio Chemical Remediation of Mercury Contaminated Hazardous Waste. US Environmental Protection Agency's workshop on Mercury:

- Removal, Recovery, Treatment, and Disposal. Alexandria, VA August 19-20, 1992.
- Hansen, C.L 1989. Waste Utilization in Cheese Processing. Proceedings of the 1989 Cheese Making Short Course. USU, Logan, UT.
- Hansen, C.L 1989. Food Waste Management. Presented at symposium in Civil and Environmental Engineering, Feb. 15. USU, Logan, UT.
- Hansen, C.L 1988. Whey Treatment and Utilization. Presented at Idaho Groundwater Quality Seminar, Nov 30-Dec 1. Twin Falls, ID.
- Hansen, C.L 1988. Waste and Energy Management in Dairy Processing. Presented at IFT, Intermountain section Symposium, March 10-11. Sun Valley, ID.
- Hansen, C.L 1988. Principles of Freezing. Presented at 1988 Utah State University Ice Cream Manufacturing Short Course, Feb. 29 - Mar 1. USU, Logan, UT.
- Hansen, C.L 1988. Energy Utilization/Waste Disposal. Proceedings of the 1988 Utah State University Cheese Making Short Course. Feb. 8-11. USU, Logan, UT.
- Hansen, C.L 1988. Refrigeration. Proceedings of the 1988 Utah State University Dairy Plant Management Short Course. Jan 11-13. USU, Logan, UT.
- Hansen, C.L 1988. Energy Utilization/Waste Disposal. Proceedings of the 1988 Utah State University Dairy Plant Management Short Course. Jan. 11-13. USU, Logan, UT.
- Hansen, C.L 1987. Methane and Protein Production, Experience and Potentials with Slaughter Rendering Wastes and Whey. Proceedings of the Design and Utility of Anaerobic Processes for Waste Treatment and Energy Recovery Symposium. Univ. of Wisconsin - Milwaukee. July 29-31. Milwaukee, WI.
- Hansen, C.L 1987. Principles of Freezing. Ice Cream Short Course. Utah State University. Feb. 23-24. Logan, UT.

**Bulletins** (Peer reviewed by engineers and scientists at the Ohio Dept. of Energy)

- Hansen, C.L, E.L. Fields and R.C. Huff. 1983. Energy Conservation in Dairy Processing Plants. Ohio Dept. of Energy, Columbus, OH. 62 pp.
- Hansen, C.L, E.L. Fields and R.C. Huff. 1983. Energy Conservation in Meat Packing Plants. Ohio Dept. of Energy, Columbus, OH. 62 pp.

**Dissertation/Report**

- Hansen, C.L 1980. Optimization of Water Usage, Wastewater Management and Associated Energy Usage in a Meat Packing Plant. Ph.D. Dissertation. The Ohio State University, Columbus, OH
- Hansen, C.L 1973. Chemical Treatment of Bovine Manure to Optimize Methane Production by Anaerobic Digestion, Technical Report, Utah State University, Logan, UT. (In lieu of M.S. Thesis).
- Hansen, C.L 1988. Refrigeration. Proceedings of the 1988 Utah State University Dairy Plant Management Short Course. Jan 11-13. USU, Logan, UT.