

Rodney Davis

B. Eng (Agr), M.Eng, C.Dec

CAREER SUMMARY

Rod commenced work with FSA Consulting in November 2004.

Since starting full-time work, Rod's focus has included sugar industry research in alternative cane harvester component designs, reviewing precision agriculture technologies for the sugar industry, undertaking red meat industry research through life cycle analysis and quantifying water and energy usage within the lot feeding sector. Rod also oversees the technical aspects of electronic data monitoring equipment including the management, maintenance and repair of automatic weather stations. In recent years, Rod has undertaken a role in irrigation efficiency, water policy & regulation and various aspects of coal seam gas consulting including beneficial use irrigation planning and the siting and design of low hazard aggregation dams.



From 1995 to 2004, Rod was a research engineer with the Farming Systems group, BSES Ltd. His primary role was to conduct research in the area of machine issues associated with the growing, harvesting and transport of sugarcane including: the conceptualisation, development, trialling and commercialisation of alternative component designs, measurement of machine loadings and environmental data through the development of real-time data acquisition and monitoring systems and the development of industry harvesting best practice guidelines.

From April to November 1995, Rod was a design engineer with Feedlot Services Australia Pty Ltd. In this position he was involved in cattle feedlots with an emphasis on conceptual design, preparation of technical specifications and earthworks, computer simulation of waste management systems including drainage, waste disposal and odour generation, preparation of Quality Assurance manuals, Environmental Impact Statements and feedlot licence applications, on-farm earth dams, furrow irrigation layouts and irrigation infrastructure works including pipeline, supply and drainage channels, culverts and earthworks.

QUALIFICATIONS

Tertiary Qualifications

Master of Engineering (Research)

University of Southern Queensland (Completed in 1995)

An Investigation of Soil Stresses and Mechanical Properties when Compacting Clay Soils

Bachelor of Engineering (Agricultural)

University of Southern Queensland (Completed in 1992)

Development of Digging Machines

Training

- **Department of Justice and Attorney-General:** Commissioner for Declarations 1996 (CDec)
- **Certificate in Hydraulic Training. HMI – Basic Hydraulic maintenance and HA2 Advanced Hydraulic systems and electronic controls.** Mannesmann Rexroth. Completed in 1997.
- **Certificate in Agricultural Chemical Application.** Queensland Rural Industry Training Council. Completed in 1996.
- St John Ambulance First Aid Course
- Qld Government White Card – Construction Induction
- ATV Training Course

EMPLOYMENT DETAILS

Extensive experience and depth of expertise in:

- Project management
- Sugarcane production, harvesting and harvester design
- Mechanical component design and power hydraulic systems
- Data acquisition systems – pressure, speed and displacement measurement
- Automatic weather stations – maintenance, repair and management
- Soil compaction and soil mechanical behaviour
- Lot fed cattle production and environmental management.
- Coal seam gas water issues (beneficial use, low hazard dams)

Well versed in sugarcane production and harvesting, lot fed cattle production and environmental management and electronic data logging equipment. This includes:

- Conceptualisation, development, trials and commercialisation of alternative cane harvester component designs.
- Development of industry cane harvesting best practice guidelines.
- Design of data acquisition systems and management of automatic weather stations.
- Working knowledge of feedlot design and environmental management. Especially water and energy usage.

Proven track record in successfully managing research projects from the client's and the designer's perspectives.

Professional Experience

December 2004 to date

Senior Agricultural Engineer, Feedlot Services Australia Pty Ltd (trading as FSA Consulting)

FSA Consulting provides agricultural, environmental and engineering services to intensive livestock industries, grain, cotton and sugar growers, abattoirs and industry. It is Australia's predominant environmental consultancy for intensive livestock

industries and also designs irrigation systems, ring tanks, channels and drains, prepares irrigation scheme plans and specifications and undertakes hydrological modelling.

Key achievements over this period include responsibility for managing Meat and Livestock Australia (MLA) funded feedlot projects, including:

- FLOT.328 – Environmental sustainability of the Australian feedlot industry. As senior project engineer responsible for managing a range of key tasks including data collection, resolving technical issues, data analysis and collation and report preparation.
- B.FLT.0339 – Water and energy usage at Australian feedlots. As principle investigator responsible for initiating the research strategy, preparation of funding proposal, all trial work and liaising with participating feedlots on operational issues.
- P.PIP.0154 - MLA undergraduate program mentor. As senior project engineer responsible for the supervision and mentoring of two penultimate year undergraduate students. Developing project specifications, directing trials and resolving technical issues.

Responsible for managing key Sugar Research and Development Corporation (SRDC) funded harvesting projects, including:

- FSA001 – A review of opportunities to improve the design and performance of sugarcane harvesters. As lead investigator accountable for the preparation of reports and liaising with industry reference groups on technology issues.
- HGP003 – Modified rotary-pinch chopper system for improved harvesting efficiency. As senior project engineer responsible for the conceptual design of a novel rotary-pinch chopper system, managing key fabrication, design and reporting tasks, accountable for all trial work and making all decisions autonomously.
- NCA009 – Review of precision agriculture technologies relevant to sugarcane production and harvesting. As lead investigator accountable for the preparation of reports and liaising with industry reference groups on technology issues.

Also responsible for:

- Ensuring projects are completed within the timeframe, according to terms of reference and within budget.
- Directing and mentoring junior professional staff as required on project tasks. Resolving local technical design issues with feedlot layouts, irrigation infrastructure developments, and environmental monitoring tasks.
- Managing an audit and needs analysis of public vehicle washdown facilities in Southern Queensland. Design and development of vehicle washdown designs.
- Design and development of electronic data logging systems. Resolving design issues with water depth sensing equipment used in on-farm water storages.

- Undertaking geotechnical investigations for proposed feedlot sites, including evaluation of suitability of material for the water-retaining structures (sedimentation and holding pond) and for pen construction.
- Management of automatic weather station design, procurement, installation and maintenance.
- Managing relationships between clients and professional staff.
- Developing and managing the FSA Consulting Quality assurance system. Developing, updating and circulating of procedures and checking practice output quality.

December 1995 to November 2004

Research Engineer, Farming Systems group, BSES Limited.

BSES Limited is the principal provider of research, development and extension to the Australian sugar industry. BSES has a long history of applying good science to problems facing sugarcane production and developing effective solutions that benefit the whole industry. BSES Limited works closely with Australian sugarcane growers, millers, harvest contractors and government to find ways to make sugarcane production more profitable and environmentally sustainable.

Key achievements over this period included responsibility for managing key Sugar Research and Development Corporation (SRDC) funded harvesting projects, including:

- BSS270 - Regional adoption of alternative harvester configurations for sustainable harvesting efficiency. This project was initiated to assess the impact of knockdown and basecutting parameters on cane yield and to synchronise machine component speeds with ground speed. As principle investigator accountable for initiating the research strategy, preparation of funding proposal, all trial work and for and making all key decisions autonomously.
- BSS252 - Development of enhanced harvester designs for optimum feeding performance when harvesting heavy lodged crops. A research cane harvester with interchangeable forward feeding modules was developed and commercialised. Performance was quantified using high-speed cine filming and high-speed data acquisition. As principle investigator accountable for managing a range of key design and construction tasks and all trial work.
- Resolving technical and contractual issues for BSS270 and BSS252.
- Ensuring milestones and projects were completed within the required timeframe and according to budget.
- Preparation of project progress reports including milestone and final reports for BSS252.
- Supervision of one project engineer and two technical staff for BSS270 and BSS252.

Also responsible for:

- WS006 - An industry review of sugarcane harvesting practices. Producing a literature review and developing farming and harvesting inputs for economic modelling.
- BSS165 - Cane harvester feeding issues in large unburnt cane crops. This project investigated the processes involved with gathering and feeding of green cane and quantified the mechanisms associated with uneven or glut/starve feeding by harvesters. Responsible for producing detailed design drawings and design evaluation of an improved gathering system and feedtrain-chopper modifications. Direct supervision of trial work and report preparation. Preparation of a final report.
- BSS188 - The performance of chopper systems on cane harvesters. Assigned to producing designs and managing the development of a chopper test rig. Development of an instrumentation system incorporating load, pressure and speed sensing transducers, interfacing circuits, programming for high-speed data acquisition. Supervision of trial work and report preparation.
- BSS210/BSS251 - The design and development of a lightweight harvester elevator and advanced secondary cleaning system. Prepared detailed design drawings and managed the development and trialling of a pre-production prototype system. Preparation of a final report.
- BSS244 - The impact of chopper harvesting on CCS in cane delivered to the mill relative to measured CCS levels of cane in the field, as part of the reason behind declining CCS. Managed the development and implementation of a field trial program, collation and analysis of trial results. This involved collection of samples, coordination of resources and ensuring trial program timelines were met. Preparation of a final report.
- Assisting in the development of best practice guidelines for growing, harvesting and transport operations. This culminated in the compilation of The Harvesting Best Practice manual.
- BSS168 - Trash management strategies to provide data for development of a policy for fire and trash management in the NSW and similar industry environments. Responsibility for the design, installation and operation of the data logging system, supervision of trials and collation of trial data.
- The design and implementation of weight transfer systems for infield haulout for New South Wales Central Tweed Harvesting Co-operative.
- Preparation of a reference manual for irrigation materials for use by BSES extension staff.

Representing BSES at industry conferences and presentation of conference papers to industry stakeholders.

March 1995 to December 1995

Design Engineer, Feedlot Services Australia Pty Ltd, (Consulting Agricultural Engineers)

Feedlot Services Australia Pty Ltd provides environmental and engineering services to intensive livestock industries. They have extensive practical experience in environmental assessment and management and irrigation system design and development.

Undertook a diverse range of design and assessment assignments including:

- Preparation of feedlot licence applications.
- Computer simulation of waste management systems including drainage, waste disposal and odour generation.
- Preparation of Quality Assurance manuals and Environmental Impact Statements.
- Cattle feedlots with an emphasis on conceptual design, preparation of technical specifications and earthworks.
- On-farm earth dams (up to 2000 ML capacity).
- Broadacre furrow irrigation layouts.
- Irrigation infrastructure works including pipeline, supply and drainage channels, culverts and earthworks.

I was employed on a casual basis and I left Feedlot Services Australia Pty Ltd to seek more permanent employment.

January 1993 to February 1995

Research Engineer, University of Southern Queensland

Worked as part of a multidisciplinary team on the Land and Water Resources Research and Development Corporation (LWRRDC) research project titled "Compaction Control and Repair practices for cropping lands in the sub-tropics". Undertook specific research on the behaviour of clay soils during compaction and compaction alleviating processes.

Undertook a diverse range of design, trials and assessment tasks including:

- Development of a simple shear apparatus.
- Field experiments to quantify the stresses applied to the soil with a soil stress transducer and soil deformation measurements using a novel pin displacement method.
- Laboratory experiments to establish the parameters of soil response utilising a simple shear box apparatus.

1990-1992

Rod was employed for a total of five months work experience by the Queensland Department of Primary Industries in the areas of odour detection research and the design of coffee harvesting and processing equipment.

OVERSEAS EXPERIENCE

2003: 2 weeks in JuJuy province, North Argentina. Site inspections and technical advice on harvester design, setup and performance in order to increase cane quality at the mill and minimise field and harvester losses on 33,000 ha sugar plantation. This work involved a series of field experiments and presentations.

AWARDS

2004 Rod Rookwood Design Award. Awarded by the Australian Society of Sugar Cane Technologists for Agriculture/Engineering design. This was awarded for the paper "Enhancing harvester forward-feeding performance: an exercise in optimising machine-crop interactions". The best paper at the ASSCT Conference which focused on innovation and excellence in agricultural or factory design of sugar industry equipment.

PUBLICATIONS

Journal papers

Davis, RJ, Carter, W, Cornford, GS, Wiedemann, SG and Ouellet-Plamondon, CM, 2008, An Investigation of Lot-Fed Cattle Drinking Water Consumption under Australian Conditions, *Agricultural Engineering International: the CIGR Ejournal*. In Press

Davis, RJ, Wiedemann, SG, Watts PJ and Ouellet-Plamondon, CM, 2009, Water Usage of Individual Activities with Australian Cattle Feedlots, *Agricultural Engineering International: the CIGR Ejournal*. In Press

Davis, RJ, Schembri, MG and Kingston, G, 2005, Optimising machine component layout for enhanced harvester feeding performance in lodged crops. *International Sugar Journal*, Vol.107, No. 1276.

Radford, BJ, Bridge, BJ, **Davis, RJ**, McGarry, D, Pillai, UP, Rickman, JF, Walsh, PA, and Yule, DF, 2000, Changes in Properties of a Clay Soil after Compaction with Header Tyres, *Soil and Tillage Research*, **54**: p 155-170.

Bakker, DM and **Davis, RJ**, 1995, Soil Deformation Observations in a Vertisol under Field Traffic, *Australian Journal of Soil Research*, **33**, p 817-32.

Conference and workshop papers

Davis, RJ, Schembri, MG and Kingston, G, 2005, Optimising machine component layout for enhanced harvester feeding performance in lodged crops. *Proceedings of International Society of Sugar Cane Technologists*, **25**: p 326-330.

Davis, RJ and Norris, CP, 2005, An investigation of the feeding characteristics of the forward-feeding zone of chopper harvesters: Development of a research harvester. *Proceedings of International Society of Sugar Cane Technologists*, **25**: p 316-323.

- Whiteing, C, **Davis, RJ** and Schmidt, EJ, 2004, Evaluation of cane loss monitoring systems. *Proceedings of Australian Society of Sugar Cane Technologists*, **26**: (CD-ROM, 12 pp).
- Schembri, MG and **Davis, RJ**, 2004, Measuring the benefits of the SRI basecutter height control system and the floating basecutter system. *Proceedings of Australian Society of Sugar Cane Technologists*, **26**: (CD-ROM, 10 pp).
- Davis, RJ** and Schembri, MG, 2004, Enhancing harvester forward-feeding performance: an exercise in optimising machine-crop interactions. *Proceedings of Australian Society of Sugar Cane Technologists*, **26**: (CD-ROM, 14 pp).
- Davis, RJ** and Norris, CP, 2003, Optimising the forward feeding zone of harvesters. Development of a research platform. *Proceedings of Australian Society of Sugar Cane Technologists*, **25**: (CD-ROM, 12 pp).
- Davis, RJ** and Norris, CP, 2002, Improving the feeding ability of sugarcane harvesters. *Proceedings of Australian Society of Sugar Cane Technologists*, **24**: p 190–198.
- Norris, CP and **Davis, RJ**, 2001, Developments in the feeding performance of sugarcane harvesters in large green crops. *Proceedings of International Society of Sugar Cane Technologists*, **24**: p 269–275.
- Hockings, PR, Norris, CP and **Davis, RJ**, 2000, Chopper systems in cane harvesters: B: Results of a test program. *Proceedings of Australian Society of Sugar Cane Technologists*, **22**: p 250–255.
- Norris, CP, Hockings, PR and **Davis, RJ**, 2000, Chopper systems in cane harvesters: A: Development of a test facility. *Proceedings of Australian Society of Sugar Cane Technologists*, **22**: p 244–249.
- Norris, CP, **Davis, RJ** and Poulsen, LP, 1998, An Investigation into the Feeding of Lodged Green Cane by Harvesters. *Proceedings of Australian Society of Sugar Cane Technologists*, **20**: p 224–231.
- Norris, CP, **Davis, RJ**, Quick, DJ and Mohammad, Y, 1998, An Alternative Approach to Cane Harvester Design: An Initial Review of the Massey Ferguson 405. *Proceedings of Australian Society of Sugar Cane Technologists*, **20**: p 10-16.
- Davis, RJ** and Harris, HD, 1995, Measuring the Variation of Soil Mechanical Properties with Treatment and Time in a Compaction Control and Repair experiment. *Proceedings of National Controlled Traffic Conference*, 13 - 14 September, 1995.

Books

- Davis, RJ**, Watts, PJ, Klepper, K and Hewitt, S, 2005, Managing Emissions from Intensive Livestock Wastes, in Chapter 5 – Greenhouse Best Practice Guide, *Australian Greenhouse Office*, Canberra.
- Sandell, GR, Agnew, JR, Stainlay, GT, Whiteing, C, **Davis, RJ**, James, MP and Norris, CP, 2002, The Harvesting Best Practice Manual for Chopper-Extractor Harvesters. *Bureau of Sugar Experiment Stations*, Indooroopilly.

Reports and Thesis

- Davis, RJ**, SG Wiedemann and Watts, PJ, 2008, Quantifying the Water and Energy Usage of Individual Activities within Australian Feedlots - Part A Report: Water Usage at Australian Feedlots – *Meat and Livestock Australia*, project B.FLT.0339 Final Report, Sydney, NSW.
- Davis, RJ**, SG Wiedemann and Watts, PJ, 2008, Quantifying the Water and Energy Usage of Individual Activities within Australian Feedlots - Part B Report: Energy Usage at Australian Feedlots – *Meat and Livestock Australia*, project B.FLT.0339 Final Report, Sydney, NSW.
- Wiedemann, SG, **Davis RJ** and Watts, PJ, 2008, 2020 Vision of The Beef Industry - Environmental and Infrastructure Requirements and Constraints of Feedlot Expansion to 2021 - *Meat and Livestock Australia*, project FLOT.132 Final Report, Sydney, NSW.
- Davis, RJ**, 2008, Review and Needs Analysis of Washdown Facilities in the South West Region, FSA Consulting Report 7027/1, Toowoomba Office, QLD.
- Davis, RJ**, Whiteing, C and Norris, CP, 2008, A review of opportunities to improve the design and performance of sugarcane harvesters, Sugar Research and Development Corporation project FSA001, Milestone Report No 2.
- Davis, RJ**, Bartels, R and Schmidt, EJ, 2007, Precision agriculture technologies – Relevance and application to sugarcane production. *National Centre for Engineering in Agriculture* Publication 1002265/1, Toowoomba, Queensland.
- Davis, RJ** and Watts, PJ, 2006, Environmental Sustainability assessment of the Australian Feedlot Industry – Part A: Water usage at Australian Feedlots, *Meat and Livestock Australia*, project FLOT.328 Final Report, Sydney, NSW.
- Davis, RJ** and Watts, PJ, 2006, Environmental Sustainability assessment of the Australian Feedlot Industry – Part B: Energy Usage and Greenhouse Gas Emission Estimation at Australian Feedlots, *Meat and Livestock Australia*, project FLOT.328 Final Report, Sydney, NSW.
- Tucker, RW, **Davis, RJ**, Klepper, K, Watts, PJ and McGahan, EJ, 2006, Environmental Sustainability assessment of the Australian Feedlot Industry – Part C: Nutrient Cycling at Australian Feedlots, *Meat and Livestock Australia*, project FLOT.328 Final Report, Sydney, NSW.
- Davis, RJ** and Watts, PJ, 2006, Environmental Sustainability assessment of the Australian Feedlot Industry – Part D: NPI Listed Substances Emission Estimation, *Meat and Livestock Australia*, project FLOT.328 Final Report, Sydney, NSW.
- Davis, RJ**, Watts, PJ and Tucker, RW, 2006, Environmental Sustainability assessment of the Australian Feedlot Industry – Part E: Review of Lot Fed Cattle Water Consumption – MRC Project No. DAQ.079, *Meat and Livestock Australia*, project FLOT.328 Final Report, Sydney, NSW.

- Davis, RJ**, 2006, Stage 2 Report – Modified Rotary-Pinch Chopper System for Improved Harvesting Efficiency. *Sugar Research and Development Corporation* project HGP003 Milestone 3 Report.
- Davis, RJ** and Heinrich, NA, 2006, Stage One Final Report – Part A. Audit and needs analysis Roma-Bungil Showgrounds and Saleyards board washdown facility – Roma Saleyards. *Queensland Murray-Darling Committee* Project WP05.
- Davis, RJ** and Heinrich, NA, 2006, Stage One Final Report – Part B. Audit and needs analysis Booringa Shire Council Washdown facility – Mitchell. *Queensland Murray-Darling Committee* Project WP05.
- Davis, RJ** and Heinrich, NA, 2006, Stage One Final Report – Part C. Audit and needs analysis Bungil Shire Council Washdown facility – Injune. *Queensland Murray-Darling Committee* Project WP05.
- Davis, RJ** and Heinrich, NA, 2006, Stage One Final Report – Part D. Audit and needs analysis Bauhinia Shire Council Washdown facility – Rolleston. *Queensland Murray-Darling Committee* Project WP05.
- Davis, RJ** and Heinrich, NA, 2006, Stage One Final Report – Part E. Audit and needs analysis Taroom Shire Council Washdown facility – Taroom. *Queensland Murray-Darling Committee* Project WP05.
- Davis, RJ**, 2005, Proof of Concepts Report – Modified Rotary-Pinch Chopper System for Improved Harvesting Efficiency. *Sugar Research and Development Corporation* project HGP003 Milestone 2 Report.
- Davis, RJ** and Schembri, MG, 2004, Enhancing Cane Harvester Design for Optimum Feeding Performance When Harvesting Heavy Lodged Crops. *Sugar Research and Development Corporation* project BSS252 Final Report SD04003.
- Davis, RJ**, 2003, Report for Ledesma S.A.A.I. Consultancy visit by RJ Davis 1st August to 13th August 2003. *BSES consultancy report* CO03015.
- Davis, RJ**, Robotham, BG, Whiteing, C and Sandell, GR, 2003, Review of Sugarcane Harvesting Practices - Minimising Cane and Juice Losses During Mechanical Cane Harvester Operations and EM in the Cane Supply. *Sugar Research and Development Corporation* project WS006. BSES consultancy report CO04003.
- Kingston, G, **Davis, RJ**, Parsons, DP, Chapman, FL, Aitken, RL and Nielsen, PJ, 2002, Sustaining Un-Burnt Production Systems in Cool Wet Environments. *Sugar Research and Development Corporation* project BSS0168 Final Report SD02025.
- Davis, RJ**, 2002, Commercialisation of Lightweight Elevator and Advanced Secondary Cleaning System for Sugarcane Harvesters. *Sugar Research and Development Corporation* project BSS0251 Final Report SD02013.
- Norris, CP and **Davis, RJ**, 2001, Lightweight Elevator and Advanced Secondary Cleaning System for Cane Harvesters. *Sugar Research and Development Corporation* project BSS0210 Final Report SD01011.

- Davis, RJ** and Norris, CP, 2001, Impact of Chopper Harvesting on the Translation of Field CCS to Factored Realised CCS. *Sugar Research and Development Corporation* project BSS0244 Final Report SD01007.
- Davis, RJ** and Norris, CP, 2000, Improved Feeding of Green Cane by Harvesters. *Sugar Research and Development Corporation* project BSS0165 Final Report SD00009.
- Norris, CP, **Davis, RJ** and Hockings, PR, 1999, Improving the Performance of Chopper Systems in Cane Harvesters. *Sugar Research and Development Corporation* project BSS0188 Final Report SD99019.
- Davis, RJ** and Chapman, FL, 1999, Development of a Trash Rake. *SRDC project* BSS0144 Final report SD99003.
- Davis, RJ**, 1995, An Investigation of Soil Stresses and Changes in Mechanical Properties When Compacting Clay Soils. *Master of Engineering Thesis*, University of Southern Queensland, Toowoomba.
- Davis, RJ**, 1992, Development of Digging Machines. *Bachelor of Engineering Thesis*, University of Southern Queensland, Toowoomba.
- Watts, PJ, **Davis, RJ** and Smith, RJ, 1992, Evaluation of an Electronic Odour Detection Meter. *Meat Research Council*, Report No DAQ 64/18.