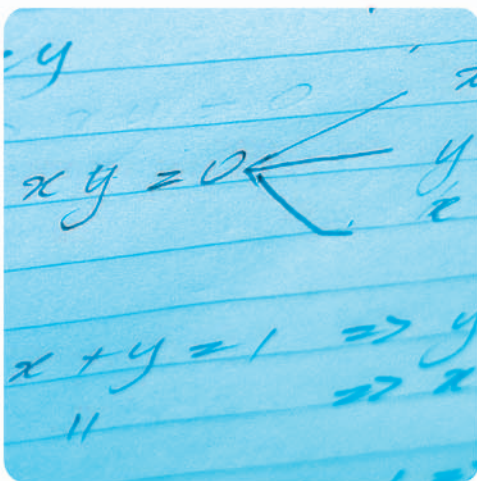


Faculty of Natural and Agricultural Sciences

Report 2008



Faculty of

**Natural and
Agricultural Sciences**

Report 2008

Issued by

Faculty of Natural and Agricultural Sciences
University of the Free State

Editorial compilation

Lacea Loader

Language revision

Nanette Lötter
Corrie Geldenhuys

Revision of bibliographical data

Mercia Coetzee

Layout and cover design

Chrysalis advertising and publishing

Photographers

Leonie Bolleurs
Stephen Collett
Reinier Brönn

Printing

Bloemfontein Repro Services

The Afrikaans version is also available on a compact disc from the dean's office or on the university's website at www.ufs.ac.za

Contents

Contents	iii
Preface	1
Faculty news	3
Departments:	
Agricultural Sciences	07
- Agricultural Economics	08
- Animal, Wildlife and Grassland Sciences	13
- Plant Sciences	20
- Soil, Crop and Climate Sciences	29
Building Sciences	37
- Architecture	38
- Quantity Surveying and Construction Management	42
- Urban and Regional Planning	46
Natural Sciences	49
- Chemistry	50
- Computer Science and Informatics	61
- Genetics	64
- Geography	68
- Geology	71
- Mathematical Statistics and Actuarial Science	77
- Mathematics and Applied Mathematics	80
- Microbial, Biochemical and Food Biotechnology	82
- Physics	94
- Plant Sciences	20
- Zoology and Entomology	99
Centres	109
- Disaster Management Training and Education Centre for Africa (DIMTEC)	110
- Environmental Management	113
- Lengau Agricultural Development Centre	117
- Microscopy	120
- Sustainable Agriculture and Rural Development	125
Experimental Farm	129
- Paradys Experimental Farm	130
Institute	133
- Groundwater Studies	134
Statistical data	137
Glossary	141

Contact details

Dean

Prof. Herman van Schalkwyk
+27 51 401 2535
hvs.sci@ufs.ac.za

Office of the dean

Ms Lorinda Rust
+27 51 401 2322
rustl.sci@ufs.ac.za

Faculty manager

Mr Johan Kruger
+27 51 401 2490
krugerjd.sci@ufs.ac.za

Marketing and liaison

Ms Stefanie Naborn
+27 51 401 2531
nabornsa.sci@ufs.ac.za

Physical address of the office of the dean

Room 9A, Biology Building, Main Campus, Bloemfontein

Postal address

University of the Free State
PO Box 339
Bloemfontein
South Africa
9300

Fax: +27 51 401 3728

E-mail: natagri.sci@ufs.ac.za

Faculty website: www.ufs.ac.za/natagri

Preface

From the Dean's Office

In 2008 the Faculty of Natural and Agricultural Sciences once again lived up to its vision to be acknowledged as a faculty that is at the forefront of the practice of natural and agricultural science where the highest levels of quality and credibility are reflected.

During the year the faculty not only remained one of the leaders in training and career development in the natural and agricultural sciences, but it also made a concerted effort to enlarge its international footprint and to establish itself internationally. This is evident in the visits of staff from the faculty to universities such as the USA-based University of Minnesota and Virginia Polytechnic Institute and State University (Virginia Tech) and the extension of international agreements between the University of the Free State (UFS) and these institutions. The faculty also had the privilege of hosting a high-level delegation from the University of Minnesota on the Main Campus in Bloemfontein in August 2008.

The turmoil in the international markets firstly led to very high oil prices, which spilt over to the grain markets and high food prices. This, in turn, led to high inflation levels and therefore high interest rates. Eventually the exchange rate also deteriorated against the major currencies. In the latter part of the year the whole situation was turned upside down with the collapse of the financial markets. The faculty did not escape this and the price of equipment for which orders were placed sky rocketed. Innovative skills had to be applied to remain on track with our equipment strategy.

Although 2008 was an exceptionally difficult year for the UFS and the institution had to bear the brunt of the Reitz video and the reaction of the national and international community, the faculty still managed to perform and expand its core business.

The faculty offers multi-disciplinary and holistic courses to send skilled and capable students into the South African workplace and to empower the labour force. Our general and extended programmes are continuously assessed and improved in order to improve our throughput rates and quality of teaching.

The staff at the faculty worked tirelessly this year to broaden our product offering and to provide our students with the best quality teaching in the country. I applaud their efforts of expanding capacity, developing programmes and strengthening re-



Prof. Herman van Schalkwyk.

lationships both within and outside the faculty and the university.

I also want to applaud the staff and students of the faculty with their achievements this year – whether it is on a personal level, in their capacity as staff member of their respective department/centre or for the faculty. To mention a few:

- Ms Estelle Heideman HIV/Aids coordinator of the Lengau Agricultural Development Centre, received a bursary to participate in a leadership programme in the United States of America (USA), which trains female leaders in South Africa who contribute to the prevention of HIV at a local, regional and national level;
- In the Department of Agricultural Economics, Prof. Johan Willemse, known for his contribution towards agriculture, was appointed on the non-executive board of Absa;

Staff in the dean's office



The staff working in the dean's office are, from the left, front: Ms Stefanie Naborn, Manager: Marketing and Liaison, Ms René Bloem, Secretary, Prof. Neil Heideman, Vice-Dean: Faculty of Natural and Agricultural Sciences; back: Mr Clasia Claassen, Assistant Administrative Officer, Mr Johan Kruger, Faculty Manager, Ms Lorinda Rust, Secretary, and Ms Mitzie Cloete, Typist/Clerical Assistant.

- Prof. James du Preez, Departmental Chair of the Department Microbial, Biochemical and Food Biotechnology, received the silver medal for exceptional published research awarded at the biennial conference of the South African Society for Microbiology hosted in Graham's Town. It was only the seventh time since 1986 that the medal was awarded;
- A study of the UFS about how the change in the packaging of DNA with cellular development is influenced by the expression of genes, in which Prof. Hugh Patterson played a leading role, was published in a leading peer-reviewed scientific journal *Proceeding of the National Academy of Sciences* of the USA (PNAS). The PNAS journal has an impact factor of 10, which means that studies published in this journal are referred to by ten other scientific studies within the scope of two years;
- Prof. Riaan Luyt, professor in Chemistry and head of the Natural Sciences Programme at the Qwaqwa Campus, received an honorary medal from the Polymer Institute of the Slovak Academy of Sciences during a conference hosted in the High Tatras mountains of Slovakia;
- Prof. Maryke Labuschagne from the Department of Plant Sciences was the recipient of the National Science and Technology Forum's (NSTF) research capacity-development award. A team consisting of Prof. Jan van der Westhuizen and Dr Susan Bonnet from the Department of Chemistry, Prof. Kenneth Swart and Prof. Thinus van der Merwe from FARMOVS-PAREXEL also

received the innovation award for an outstanding contribution to science, engineering and technology by either an individual or a team over the last ten years from the NSTF;

- Prof. Maryke Labuschagne received a second prestigious national award for her research when the 2008 Cereal Science and Technology - SA's (CST-SA) Award for research and development was awarded to her; and
- Prof. Ivan Horak, extraordinary professor at the university's Department of Zoology and Entomology, became the third person in the history of the UFS to receive the D.Sc. degree.

In closing I would like to thank the faculty's lecturing staff for their support and enthusiasm during the past year. However, none of these achievements would have been possible without the interest and hard work of the administrative staff.

During 2008 we have all worked together to live up to the faculty's motto: "There is no substitute for excellence!" This report covers the activities of the faculty in 2008. It is a reflection of a year's commitment from a team of highly skilled academic and support staff.

Prof. Herman van Schalkwyk
Dean: Faculty of Natural and Agricultural Sciences
University of the Free State

Faculty news

Successful visit from delegation of the University of Minnesota

A senior delegation from the University of Minnesota in the United States of America (USA) paid a very successful visit to the University of the Free State (UFS) in May 2008 to explore ways of strengthening already existing ties between the two institutions.

Teacher training, capacity building in health sciences and student preparedness were among the areas of cooperation that were investigated, within the context of the Strategic Academic Cluster initiative of the UFS. Poverty reduction strategies were also a strong focus area.

The Faculty of Natural and Agricultural Sciences has had a cooperation agreement with the University of Minnesota's Department of Applied Economics since 2002 and the exchange of staff



During the visit are, from the left: Prof. Herman van Schalkwyk, Dean: Faculty of Natural and Agricultural Sciences at the UFS, Prof. Robert Jones, Senior Vice-President: System Academic Administration at the University of Minnesota, Dr Meredith Quiad, Associate Vice-President and Dean: International Programmes, University of Minnesota, Prof. Teuns Verschoor, Acting Rector of the UFS and Prof. Ezekiel Moraka, Vice-Rector: Student Affairs at the UFS.

has been taking place on a regular basis. This agreement will be expanded and both institutions are now exploring the possibility of

applying it across faculties. Both institutions have committed seed funding to formalise the cooperation agreement.

50 years of Agriculture celebrated



The faculty celebrated 50 years of the teaching of agriculture at the UFS in November 2008. Part of the celebrations was a seminar with the theme "Challenges in a changing agricultural environment". Some of the guest speakers are, from the left: Mr Corwyn Botha, Chairman: Agri Business Chamber and Managing Director of the Cape Agri Group, Mr Motsepe Matlala, President of NAFU, Mr Hans van der Merwe, Executive Head: Agri SA, Prof. Herman van Schalkwyk: Dean: Faculty of Natural and Agricultural Sciences at the UFS, and Mr Sugar Ramakarane, Head: Department of Agriculture, Free State Province.

Winners of NSTF awards assist with recruitment of students



Here are, from the left: Dr Martin Ntwaeaborwa, senior lecturer at the Department of Physics and finalist in the category for black researchers, Prof. Kenneth Swart, FARMOVS-PAREXEL, Prof. Maryke Labuschagne, head of Plant Breeding at the UFS's Department of Plant Sciences and female recipient of the award for the development of research capacity over the past five to ten years, and Prof. Jan van der Westhuizen, Department of Chemistry at the UFS; front: Ms Kedibone Aphane, MRC. Prof. Swart and Prof. Van der Westhuizen were the leaders of the team who received the award for the development of innovation by a corporate organisation or institution.

Representatives of the South African Medical Research Council (MRC) visited the UFS to recruit students who want to study in the fields of sci-

ence, engineering and technology. To assist with the recruitment, the winners of awards made by the National Science and Technology Forum (NSTF) earlier this year,

made presentations to create an interest amongst students. The UFS had four finalists of whom two were the winners in their respective categories.

Young scientists learn what faculty can offer



Young science lovers gathered in Sasolburg for the annual Sasol TechnoX in August 2008. The faculty's exhibition captured the learners' attention through an interactive representation of the application fields of science. Delegates from the Departments of Mathematics and Applied Mathematics, Chemistry, Zoology and Entomology, as well as UFS Marketing stood ready to answer the questions of the 20 832 learners who attended the event. Pictured here is Theo Viljoen, M.Sc. student in Forensic Entomology, sharing interesting facts regarding insects with learners.

Two UFS academics appointed on the Land Bank Board



Prof. Herman van Schalkwyk (left), Dean: Faculty of Natural and Agricultural Sciences, and Mr Theo Potgieter from the UFS School of Management were appointed on the Land Bank Board in March 2008. Prof. van Schalkwyk was appointed as Director and Deputy Chairperson and Mr Potgieter as Director of the Board. The appointments were made by the Minister of Agriculture and Land Affairs, Ms Lulu Xingwana, and are effective for a period of four years.

UFS extends exchange agreement with USA university



Here are, from the left, front: Dr SK de Datta, Vice-Rector: International Affairs, VT, Prof. Herman van Schalkwyk, Dean of the Faculty of Natural and Agricultural Sciences, UFS, Dr Martin Ntwaeaborwa, senior lecturer at the Department of Physics, UFS; back: Prof. Jim McKenna, Department of Crop, Soil and Environmental Affairs, VT, Prof. Izak Groenewald, Director of the Centre for Sustainable Agriculture and Rural Development at the UFS and responsible for the faculty's international liaison, Dr Michael Bertelsen, VT's international office, Dr Aldo Stroebel, Head: Internationalisation at the UFS and Dr Liesel Herselman, senior lecturer at the Department of Plant Sciences, UFS.

A delegation from the faculty visited the Virginia Tech University (VT) in the USA in June 2008 to confirm and extend the existing student exchange agreements between the two institutions.

During the visit the agreement, which started in 1997, was extended for the next five years. More than 150 students from both institutions have already taken part in this exchange agreement and it is the most successful student exchange agreement that VT is involved in. Although agricultural students from the UFS initially took part in the agreement, it was extended to other departments in the faculty and also to the rest of the UFS.

Itjoriseng Project launched



The faculty launched the Itjoriseng Project on the Main Campus in Bloemfontein in March 2008. The aim of the project is to improve the skills of teachers in the subjects Mathematics and Physical Science for Grades 10–12. "Itjoriseng" is the Sotho word for "sharpen yourself". At the launch were, from the left: Mr Mzamo Jacobs, Director: Curriculum Development for Further Education and Training, Free State Department of Education, Mr Johan Kruger, Faculty Manager, Ms Elna Marais, Chief Education Specialist: Curriculum Development, Free State Department of Education, and Prof. Herman van Schalkwyk, Dean: Faculty of Natural and Agricultural Sciences at the UFS.

2007 Faculty report launched



The faculty once again produced another report in which the various departments and centres highlighted their activities for 2007. The report was so well received that a second edition had to be printed. Here are some of the departmental chairpersons during the launch of the report in June 2008.

Department of

Agricultural Economics

“The department has developed into one of the leading departments of agricultural economics in South Africa” - Prof. Johan Willemse.



Prof. Johan Willemse.

Overview

The Department of Agricultural Economics originated in 1958 and celebrated its 50th anniversary in 2008. The department has developed into one of the leading departments of agricultural economics in South Africa and possibly even in Africa, attracting many students from countries such as Nigeria, Botswana, Ethiopia and Eritrea.

During 2008, 14 undergraduate and 28 postgraduate international students were registered in agricultural economics courses. A total of 17 Ph.D. students, 23 master's and 37 honours students were registered in 2008. Two lecturers, Drs Pieter Taljaard and Bennie

Grové, as well as two Ph.D. students graduated in April 2008. Mr Ferdie Botha, a senior student, obtained his master's degree with distinction at the September 2008 graduation ceremony.

The Agricultural Economics Association of South Africa (AEASA) held its 46th annual conference in Windhoek from 23-26 September 2008 with the theme “Rethinking agriculture and rural development in Southern Africa”. Seventeen students and staff attended the conference where they presented eight papers and three posters. During this conference Mr F Maré won the prize for the best student essay and Mr AO Ogundeji received

second prize in the best poster category.

Prof Giel Viljoen was the co-recipient of the Douw Greef Award from the “Suid-Afrikaanse Akademie vir Wetenskap en Kuns”, together with Dr Herman Booysen from Net Group S.A. and Prof Gawie de Villiers. The prize was awarded for an article published in the March 2007 edition of *Die Suid-Afrikaanse Tydskrif vir Natuurwetenskap en Tegnologie*.

Five students from the department and Prof. Herman van Schalkwyk, Dean of the Faculty of Natural and Agricultural Sciences at the University of the Free State (UFS) attended the International Food and Agribusiness Management Association's (IAMA) conference in Monterrey, California, United States of America (USA) from 14-17 June 2008, where they presented papers.

Prof. Johan Willemse, Departmental Chairperson, Dr Pieter Taljaard, Dr Wimpie Nell, Mr David Spies and Miss Lize Terblanche, amongst others, are often invited as guest speakers to various farmers' days presented in the Free State and other provinces.

The quarterly Agricultural Market Outlook workshops held on the Main Campus by Prof. Willemse were well attended by Agri businesses and farmers from all over South Africa. Guest speakers who made presentations at these workshops were Mr Louis Bekker, Multi-Manager from Barnard Jacobs Mellet Holdings,

and representatives from Suidwes Landbou amongst others.

A Safex course was held on the Main Campus in November 2008 with 25 delegates attending. The course covered aspects of futures trading, presenting a perspective on the main elements of the supply and demand of commodities.

The department has a strong focus on water research which is mainly funded by the Water Research Commission. Dr Bennie Grové has established himself as one of the leading experts in the field of water use optimisation and decision support through research that he and his team have done for the Water Research Commission (WRC) over a period of ten years. They contributed to the successful completion of two WRC funded projects in 2008. These projects were in connection with:

- integrating and upgrading of SAPWAT and PLANWAT to create a powerful and user-friendly irrigation water planning tool; and
- market risk, water management and the multiplier effects of irrigation agriculture with reference to the Northern Cape Province.

Two new WRC projects were also started. These projects are in connection with:

- the development and testing of an integrated set of models to evaluate the financial/economic



Three academics from the department were awarded the Douw Greeff Prize from the Suid-Afrikaanse Akademie vir Wetenskap en Kuns. The prize is awarded to a research or summary article of high scientific quality that was published in the SA Tydskrif vir Natuurwetenskap en Tegnologie during the year preceding the prize. Here are Dr Herman Booysen (left) and Prof. Giel Viljoen. The other member of the team, Prof. Gawie de Villiers, was absent when the photo was taken.

- impact of curtailment decisions on three participant farm case study areas in the Crocodile Catchment; and
- technology transfer on the technical aspects and cost-estimating procedures of surface and drip irrigation systems.

Dr Grové's research team also started fieldwork on another WRC funded project that focuses on the contribution of water use to agricultural value chains and on

how emerging farmers can be sustainably integrated into these value chains. The research is conducted with Mr Henry Jordaan (lecturer and Ph.D. candidate) and Mr Marvin Khaile (M.Sc. student) in Eksteenskui, a farming community of about 100 farmers along the banks of the Orange River which export raisins under the Fair Trade agreement.

The strong focus of the department on water research was also visible in its representation at the 3rd biannual symposium of the South African Commission on Irrigation and Drainage (SANCID) that was held at Club Mykonos in Langebaan, Western Cape. Six papers were presented at the symposium by staff and students of the department.

Dr Grové was also invited to participate in an international planning workshop in Dakar, Senegal, to establish an African Growth and Development Policy Modelling Consortium.

The second SADC/PRINT Short Course in Livestock Marketing and Trade was presented during April 2008 and, according to feedback from participants, it was rated an enormous success. Participants were unanimous in expressing



Dr Pieter Taljaard from the department with some of the SADC participants in the 2nd Short Course in Livestock Marketing and Trade, presented during April 2008. Delegates from Tanzania, Malawi, Swaziland, Namibia, Zambia, Zimbabwe, Botswana, Lesotho, Mauritius and Madagascar attended the course.



From the left are: Dr Patricia Elder, Vice-President of the National Council on Economic Education (NCEE), Prof. Klopper Oosthuizen from the department and Director: South African Foundation for Economic and Financial Education (SAFEFE), and Ms Winkie Direko, Member of Parliament and Chairperson of SAFEFE.



During a visit to the University of Minnesota in the United States of America are, from the left: Dr Michael van Wyk, Department of Curriculum Studies at the UFS, Prof. Klopper Oosthuizen from the department, Prof. Claudia Parliament, University of Minnesota, and Prof. Herman van Schalkwyk, Dean: Faculty of Natural and Agricultural Sciences.

their appreciation to the UFS and the Southern African Development Community (SADC) for affording them the opportunity to attend the course with all expenses covered by SADC/PRINT. The course is accredited by the UFS and is highly recommended by the SADC and some government departments. International visitors from the SADC Head Office in Gaborone, Botswana included Dr Welbourne

Madzima, Dr Pascal Bonnet, Mr Gerard Oosterwijk, Dr Berhanu Bedane and Dr Gift Wanda.

Both Dr Pieter Taljaard and Mr David Spies are currently involved with national institutions, namely the Red Meat Producers Organisation (RPO), the National Agricultural Marketing Council (NAMC), Cape Wools SA, the National Wool Growers' Association (NWGA), the South African Feedlot Association (SAFA), the Red Meat Abattoirs Association (RMAA), and the South African Wildlife Management Association (SAWMA), and on an international level with Agri Benchmark, the SADC, and the Organisation for Economic Cooperation and Development (OECD).

The Centre for Agricultural Management continued with its courses for commercial farmers, namely financial planning and management and strategic management in agriculture.

The centre was appointed by the National Department of Agriculture as a Centre of Excellence. The main aim of the initiative is to facilitate excellence model training, which is aimed at improving the skills of developing farmers and farming businesses. The excellence model aims to assist farmers in identifying gaps in business skills. These gaps will be addressed by means of short courses, and will help to close the gap between the first and fourth economies.

The centre was officially launched on 7 May 2008. Training started with 25 facilitators who then facilitated the model to 45 farmers in the Free State province. The UFS, as coordinator of the SMME Excellence Model, the Free State Department of Agriculture, the private sector, municipalities, small enterprise development agencies, and non-governmental organisations will be working together to enhance excellence in agricultural businesses in the Free State.

Another very successful project of the centre is the vermiculture and vermicomposting course. In November 2008 a course was presented by Mr Charl Pienaar from GoodBugs in Paarl, at the

Mangaung-University of the Free State Community Partnership Programme (MUCPP). It was attended by 50 people, including farmers and home gardeners. Two people from the Free State Residential Care Centre for mentally challenged adults in Bloemfontein also attend the course and a worm farming system was then handed over to them. The worm farm at the MUCPP has grown in such a way that people from across the country buy red worms (*Eisenia fetida*) at the farm to use as compost in vegetable gardens.

Prof. Klopper Oosthuizen and Ms Ina Combrinck are involved in six international programmes with the USA-based National Council on Economic Education (NCEE), namely NCEE Train the Trainer, NCEE Train the Teacher, NCEE Train the Writer, the NCEE alumni US Study Tour, NCEE Education Leaders' Study Tour and the US Teachers' exchange programme.

The fourth group of 53 trainers, consisting of subject advisors in economics and management sciences as well as lecturers from four universities, completed their Train the Trainer training in June 2008 in Durban. All nine provinces and four universities were represented in the fifth group of 52 trainers. The training was conducted by outstanding professors from four international universities, namely the University of Minnesota, Florida State University, Colorado State University in the USA and National Technical University of Kharkiv, Ukraine.

Prof. Claudia Parliament worked with Prof. Oosthuizen during the first five months of the year on a strategic positioning of the South African Foundation for Economic and Financial Education (SAFEFE) in the country. Prof. Meghan Millae and Prof. Jon Rezek, both from the Mississippi State University, USA were part of abovementioned team. The three visitors were involved in the teaching and learning programme of the faculty and department. The visitors also presented guest lectures at the university's Centre for Higher Education Studies and Development (CHESD). The basis for their collaboration was to

develop a stronger relationship between the UFS and the Department of Education in the advancement of economic education.

SAFEFE was involved in three community service projects, namely the second Economics Olympiad in the Free State, and teacher professional development in the Eastern Cape and the Free State. The Economics Olympiad was conducted in collaboration with the NCEE, the Free State Department of Education and service learning at the UFS. About 1 500 learners and 377 teachers in 259 Free State elementary schools participated. The competition consisted of four rounds.

The memorandum of agreement between the department and Department of Applied Economics at the University of Minnesota, USA was renewed for another six years and has become the instrument to develop greater institutional collaboration between the two universities.

Following a visit to the UFS by representatives of the University of Minnesota in August 2008, the university's International Office arranged a visit to the University of Minnesota in December 2008 as the beginning of a possible ten-year project to make teaching and community service more effective. ■

Research outputs

Research articles

De Villiers, G.duT., Viljoen, M.F. & Booysen, H.J. 2008. Aardverwarming en klimaatsverandering met spesifieke verwysing na Suid-Afrika: Enkele perspektiewe. *Suid-Afrikaanse Tydskrif vir Natuurwetenskap en Tegnologie* 27(4): 294-306.

Jordaan, H. & Grové, B. 2008. Factors affecting the level to which Vaalharts maize producers are willing to use forward pricing in price risk management. *Agrekon* 47(1): 102-115.

Worako, T.K., Van Schalkwyk, H.D., Alemu, Z.G. & Ayele, G. 2008. Producer price and price transmission in a deregulated Ethiopian coffee market. *Agrekon* 47(4): 492-506.

Reports

Armour, R.J. & Viljoen, M.F. 2008. *Analysis of the financial and economic feasibility of drainage in the Orange-Vaal-Riet and Lower-Orange irrigation areas.* Final report number K8/703/4 to the Water Research Commission (WRC) Consultancy, Pretoria, South Africa.

Louw, D.B., Van Schalkwyk, H.D., Grové, B. & Taljaard, P.R. 2008. *Market risk, water management and the multiplier effects of irrigation agriculture with reference to the Northern Cape Province, Volume 1.* Report to the Water Research Commission (WRC), Pretoria, South Africa.

Taljaard, P.R., Van Schalkwyk, H.D. & Louw, D.B. 2008. *Market risk, water*

management and the multiplier effects of irrigation agriculture with reference to the Northern Cape Province, Volume 2. Report to the Water Research Commission (WRC), Pretoria, South Africa.

Conference contributions

Baiphethi, M.N., Viljoen, M.F., Kundhlande, G., Minkley, G. & Ralehlolo, G.N. 2008. *Rainwater harvesting and conservation (RWH&C) for livelihoods creation in rural areas of South Africa: The case of Free State and Eastern Cape.* Paper presented at the 46th Annual Conference of the Agricultural Economics Association of South Africa (AEASA): Rethinking Agriculture and Rural Development in Southern Africa, Safari Lodge, Windhoek, Namibia. 23-26 September.

Botha, F.C., Taljaard, P.R., Jooste, A. & Pelsler, A. 2008. *Segmenting the Free State Province (FSP) Food Consumer.* Paper presented at the 46th Annual Conference of the Agricultural Economics Association of South Africa (AEASA): Rethinking Agriculture and Rural Development in Southern Africa, Safari Lodge, Windhoek, Namibia. 23-26 September.

Cloete, P.C., Jooste, A., Botha, F. & Taljaard, P.R. 2008. *Analysing factors and attributes influencing beef consumption patterns and preferences on a municipal-level: The case of Bloemfontein, South Africa.* Paper presented at the 18th Annual World

Staff

Professors: Profs Klopper Oosthuizen, Giel Viljoen

Professors Extraordinary: Profs Jan Groenewald, Kit le Clus

Associate Professors: Prof. Johan Willemse

Affiliated Associate Professors: Profs André Jooste, Daan Louw, Zerihun Alemu

Senior Lecturers: Drs Wimpie Nell, Kobus van Staden, Godfrey Kundhlande, Pieter Taljaard, Bennie Grové

Lecturers: Mr Henry Jordaan, Mss Lize Terblanche, Nicky Matthews, Leandre du Preez

Senior Typist: Ms Dora du Plessis

Senior Officer: Ms Marie Engelbrecht

Officer: Ms Ina Combrinck

Typist/Clerical Assistants: Mss Wilna du Plessis, Francia Neuhoff, Chrizna van der Merwe

Secretary: Ms Louise Hoffman

Professional Officer: Ms Annelly Minnaar

Research Assistants: Mss Lize Terblanche, Nicky Matthews, Leandre du Preez, Messrs Ferdie Botha, Flippie Cloete, Attie du Plessis, Philip Fourie, Wim Grobbelaar, Marvin Khaile, Abraham Landman, Frikkie Maré, Petso Mokhatla, Abiodun Ogundeji, David Spies, Dirkie Strydom, Walter van Niekerk

Contact details

Prof. Johan Willemse
Faculty of Natural and Agricultural Sciences
Department of Agricultural Economics
University of the Free State
PO Box 339
Bloemfontein
South Africa
9300

Telephone: +27 51 401 3862

Fax: +27 51 401 3473

E-mail: willemsebj.sci@ufs.ac.za

Website: www.ufs.ac.za/agri-econ

Forum and Symposium of the International Food and Agribusiness Management Association (IAMA), Monterey, California, USA. 14-17 June.

Grové, B. & Oosthuizen, L.K. 2008. *Establishing plausible ranges of absolute risk aversion for constant absolute risk aversion utility functions.* Paper presented at the 46th Annual Conference of the Agricultural Economics Association of South Africa (AEASA): Rethinking Agriculture and Rural Development in Southern Africa, Safari Lodge, Windhoek, Namibia. 23-26 September.

Grové, B. & Oosthuizen, L.K. 2008. *Impact of capital availability on long-run irrigation water derived demand for alternative farm development scenarios.* Paper presented at the 3rd Biannual Symposium of the South African National Commission on Irrigation and Drainage (SANCID), Club Mykonos, Langebaan, South Africa. 18-20 November.

Jordaan, H. & Grové, B. 2008. *Assessment of the contribution of water use to value chains in agriculture: A*

conceptual framework. Paper presented at the 3rd Biannual Symposium of the South African National Commission on Irrigation and Drainage (SANCID), Club Mykonos, Langebaan, South Africa. 18-20 November.

Matthews, N., Grové, B., Barnard, J.H. & Van Rensburg, L.D. 2008. *An economic case for salinity management.* Paper presented at the 3rd Biannual Symposium of the South African National Commission on Irrigation and Drainage (SANCID), Club Mykonos, Langebaan, South Africa. 18-20 November.

Matthews, N., Grové, B., Barnard, J.H. & Van Rensburg, L.D. 2008. *Economic analysis of salinity management.* Paper presented at the 1st Annual Orange River Basin Symposium, University of the Free State, Centre for Environmental Management, Bloemfontein, South Africa. 12-13 November.

Matthews, N., Grové, B., Barnard, J.H. & Van Rensburg, L.D. 2008. *Modelling the economic effects of irrigation water salinity management for sustainable crop production.* Paper

presented at the 46th Annual Conference of the Agricultural Economics Association of South Africa (AEASA): Rethinking Agriculture and Rural Development in Southern Africa, Safari Lodge, Windhoek, Namibia. 23-26 September.

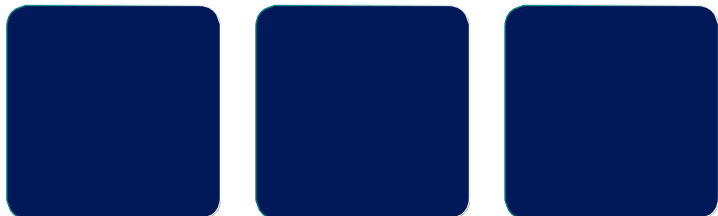
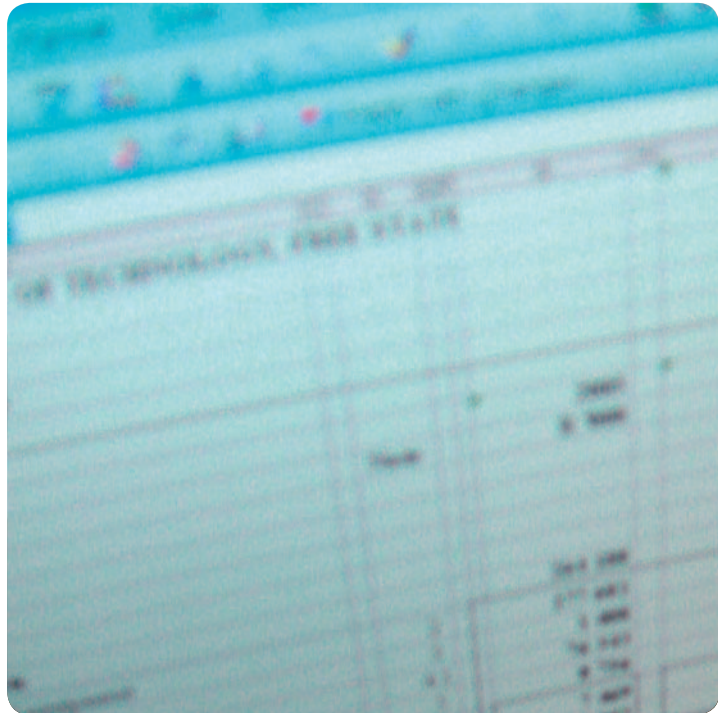
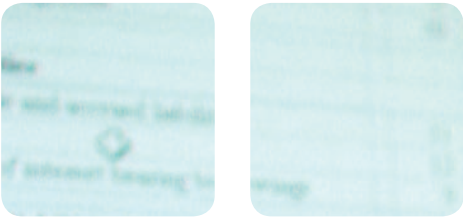
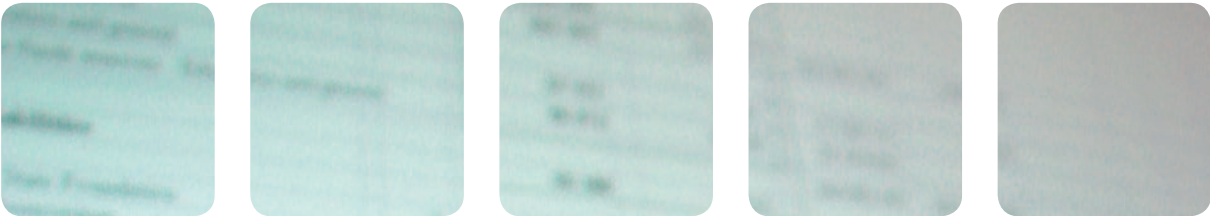
Strydom, D.B., Meyer, F., Taljaard, P.R., Strauss, P.G. & Funke, T. 2008. *Energy policies and the oil prices: Testing for sensitivity in the animal feed industry.* Paper presented at the 46th Annual Conference of the Agricultural Economics Association of South Africa (AEASA): Rethinking Agriculture and Rural Development in Southern Africa, Safari Lodge, Windhoek, Namibia. 23-26 September.

Taljaard, P.R. & Jooste, A. 2008. *A South African beef farm story.* Paper presented at the Agri-benchmark Beef Conference, Brazilia, Brazil. 23-29 June.

Taljaard, P.R. & Spies, D.C. 2008. *Prysmarges van rooivleis.* Paper presented at the Annual Congress of the North West Red Meat Producers Organization, Vryburg, South Africa. 15 April.



Statistical data

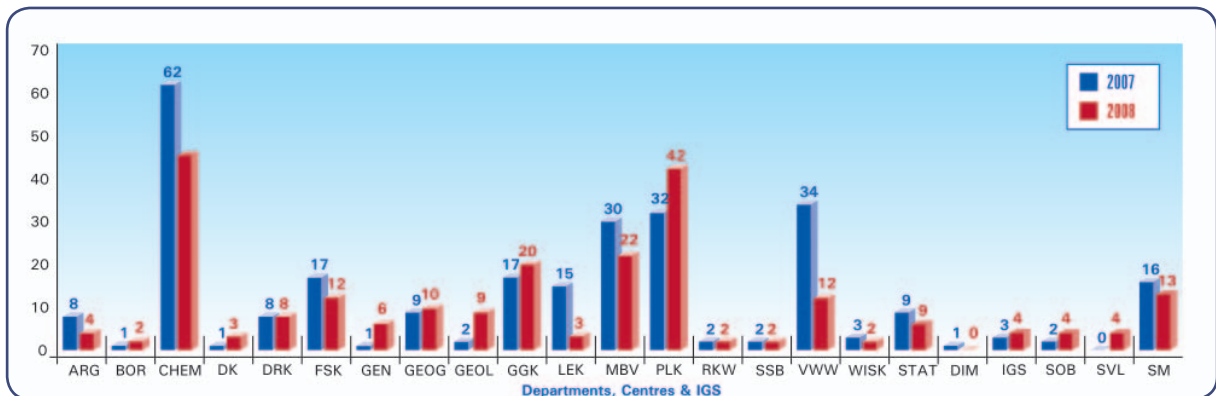


Research outputs: 2007-2008

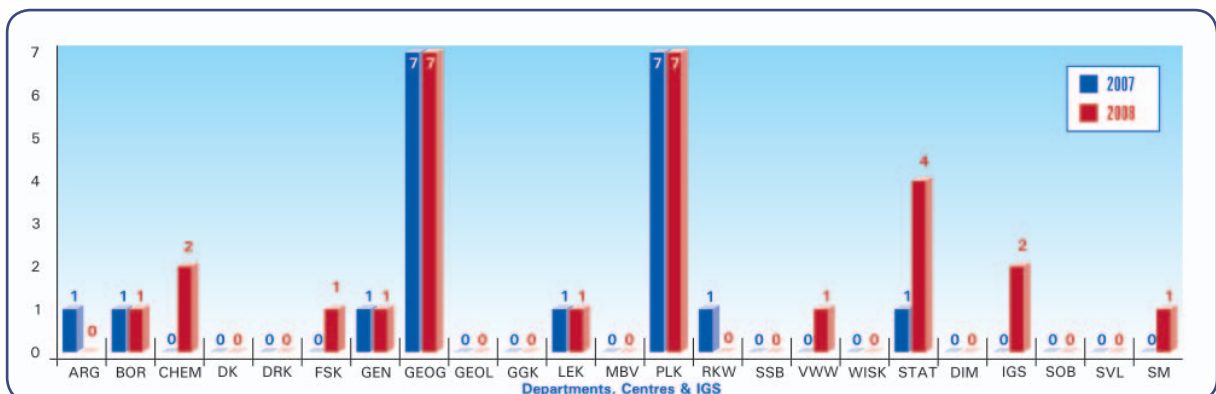
List of abbreviations

Abbreviation	Name	Abbreviation	Name
ARG	Department of Architecture	GGK	Department of Soil, Crop and Climate Sciences
BOR	Department of Quantity Surveying and Construction Management	IGS	Institute for Groundwater Studies
SOB	Centre for Environmental Management	LEK	Department of Agricultural Economics
CEM	Department of Chemistry	MBV	Department of Microbial, Biochemical and Food Biotechnology
SM	Centre for Microscopy	PLK	Department of Plant Sciences
SVL	Centre for Sustainable Agriculture and Rural Development	RKW	Department of Computer Science and Informatics
DK	Dean's Office	SSB	Department of Urban and Regional Planning
DRK	Department of Zoology and Entomology	SRB	Disaster Management Training and Education Centre for Africa (DIMTEC)
FSK	Department of Physics	VWW	Department of Animal, Wildlife and Grassland Sciences
GEN	Department of Genetics	STAT	Department of Mathematical Statistics and Actuarial Science
GEOG	Department of Geography	WISK	Department of Mathematics and Applied Mathematics
GEOL	Department of Geology		

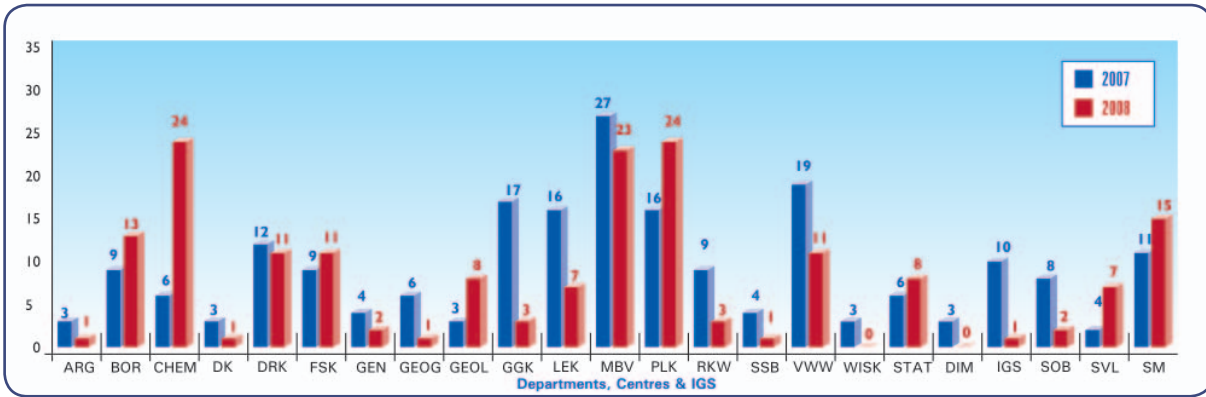
Accredited articles



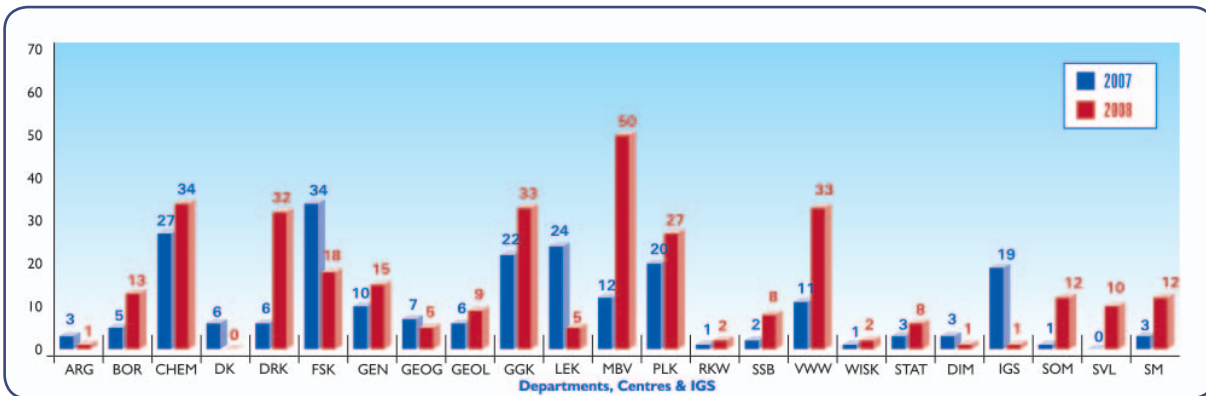
Books



International conferences



Local conferences



Student figures: 2007-2008

Student figures

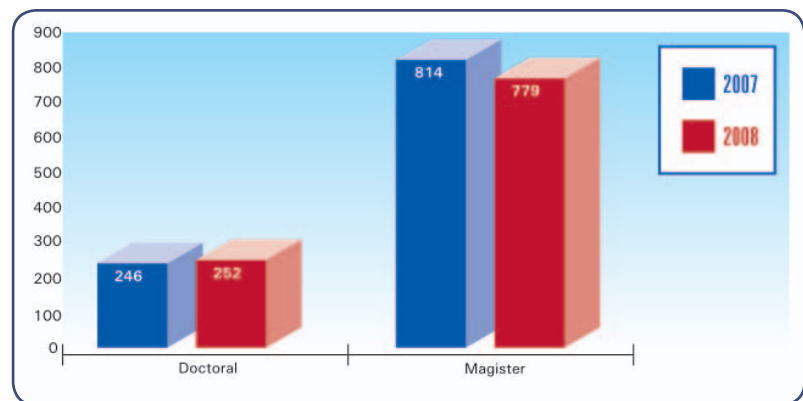
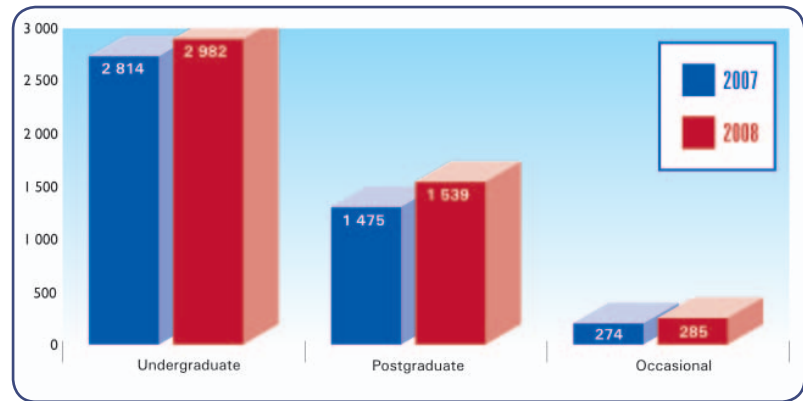
Year	Description	Black	Coloured	Asian	White	Total
2007	Undergraduate	1492	66	38	1218	2814
	Postgraduate	710	41	40	684	1475
	Occasional	230	6	2	36	274
*TOTAL		2432	113	80	1938	4563
2008	Undergraduate	1667	51	37	1227	2982
	Postgraduate	755	40	43	701	1539
	Occasional	260	5	1	19	285
* TOTAL		2682	96	81	1947	4806

International students

Nationality	Year	Year
	2007	*2008
Angola	2	0
Asian countries	20	24
Botswana	17	23
Democratic Republic of the Congo	0	1
European countries	9	10
Lesotho	118	144
Malawi	3	5
Mauritius	2	3
Mozambique	4	7
Namibia	54	65
North America	15	5
Other African countries	47	69
South America	1	0
Swaziland	5	6
Zambia	7	7
Zimbabwe	48	60
Total	352	429

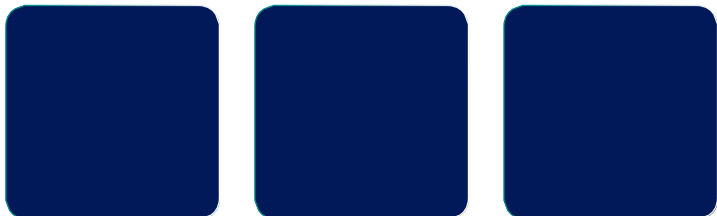
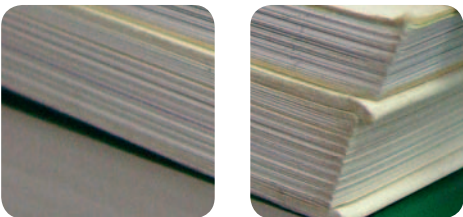
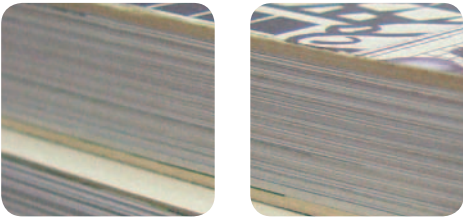
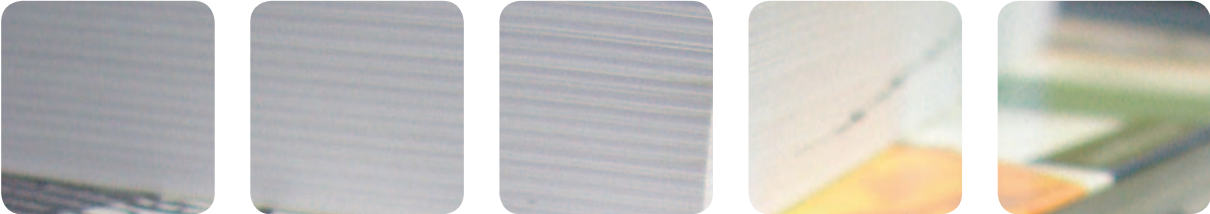
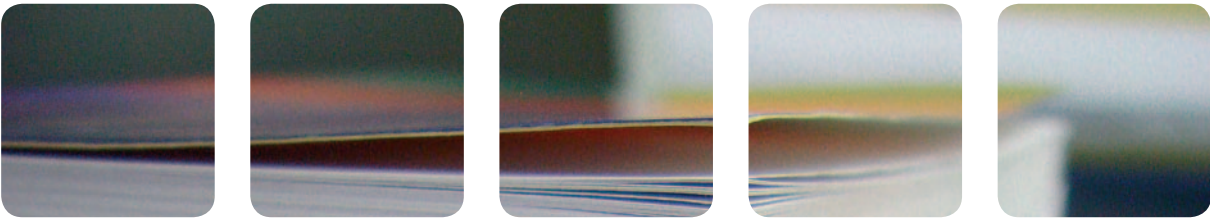
*2008 Final HEMIS figures not available

Comparison for the Faculty of Natural and Agricultural Sciences





Glossary



Glossary

A

- AACC - American Association for Cereal Chemists
 AAACE - Association for the Advancement of Cost Engineering
 ADF - Amsterdam Density Functional Programme
 ADG - Average Daily Grain
 AEASA - Agricultural Economics Association of South Africa
 AEON - the African Earth Observation Network
 AGU - American Geophysical Union
 AI - Artificial Insemination
 ARC - Agricultural Research Council
 ARV - Antiretroviral
 ASC - Architecture Student Conference
 ASAQS - Association of South African Quantity Surveyors
 ASOCSA - Association of Schools of Construction of Southern Africa

B

- BBSRC - Biotechnology and Biological Sciences Research Council
 BMBF - Federal Ministry of Education and Research, Germany

C

- CAA - Commonwealth Association of Architects
 CANSA - Cancer Association of South Africa
 CAB - Centro de Astrobiología
 CED - Centre for Education Development
 CePHMa - Centre for Plant Health Management
 CHESD - Centre for Higher Education Studies and Development
 CHPC - Centre for High Performance Computing
 CIDB - Construction Industry Development Board
 CIOB-SA - Chartered Institute of Building, South Africa
 CSIR - Council for Scientific and Industrial Research Organisation
 CSTA - Cereal Science and Technology Association
 CUT - Central University of Technology

D

- DiMTEC - Disaster Management Training and Education Centre for Africa
 DMISA - Disaster Management Institute of Southern Africa
 DRRW - Durable Rust Resistance in Wheat
 DST - Department of Science and Technology
 DWAF - Department of Water Affairs and Forestry

E

- ECA - European Crystallographic Association
 EGIC - Economic Growth and International Competitiveness
 EMSA - Environmental Management Systems Association
 EMS - Environmental Management Systems
 EPWP - Expanded Public Works Programme

F

- FAO - Food and Agricultural Organisation
 FETWater - Framework Programme for Research Education and Training in Water
 FMP - Facilities Management Programme
 FSRDPP - Free State Rural Development Partnership Project
 FTIR - Fourier Transform Infra Red Spectrometer

G

- FGAP - Facility for Genomics and Proteomics
 GIS - Geographical Information Systems
 GMO - Genetically Modified Organisms
 GRDM - Groundwater Resource Directed Measures
 GSSA - Grassland Science Society of South Africa
 GSSA - Geological Society of South Africa

H

- HCI - Human-computer Interaction
 HRTEM - High Resolution Transmission Electron Microscopy

I

- IAMA - International Food and Agribusiness Management Association
 IAU - International Astronomical Union
 ICACS - International Conference on Atomic Collisions in Solids
 ICC - International Conference on Coordination Chemistry
 ICEC - International Cost Engineering Council
 ICRISAT - International Crops Research Institute for the Semi-Arid Tropics
 ICSU - International Council for Science
 IDC - Industrial Development Corporation
 IGC - International Geological Congress
 IGS - Institute for Groundwater Studies
 IMWA - International Mine Water Association
 INCRoP - Insects on New Crops Programme
 IPMP - Intensive Project Management Programme
 ISI - International Statistical Institute
 ISME - International Society for Microbial Ecology
 IT - Information Technology
 IUIMS - International Union of Microbiological Societies

L

- LPI - Lunar and Planetary Institute
 LRAD - Land Redistribution for Agricultural Development

M

- MCEE - Minnesota Council on Economic Education
 MDC - Maputo Development Corridor
 MEC - Member of the Executive Council
 MNS - Material and Nanosciences Cluster
 MOU - Memorandum of Understanding
 MRC - Medical Research Council
 MSA - Masters in Sustainable Agriculture
 MSSA - Microscopy Society of Southern Africa
 MUCPP - Mangaung University Community Partnership Programme

N

NAMC - National Agricultural Marketing Council
 NASA - National Aeronautics and Space Administration
 NASSP - National Astrophysics and Space Science Programme
 NBN - National Bioinformatics Network
 NCEE - National Council for Economic Education
 NDF - Neutral Detergent Fibre
 NECSA - Nuclear Energy Corporation of South Africa
 NERPO - National Emergent Red Meat Producers Organisation
 NGO - Non-Governmental Organisation
 NRF - National Research Foundation
 NSTF - National Science and Technology Forum
 NWGA - National Wool Growers' Association

O

OECD - Organisation for Economic Cooperation and Development

P

PAQS - Pacific Association of Quantity Surveyors
 PDMS - Provincial Disaster Management Centre
 PRT - Protein Research Trust

R

RDP - Redress and Development Programme
 RIBA - Royal Institute of British Architects
 RICS - Royal Institute of Chartered Surveyors
 RIEP - Research Institute of Education Planning
 RMMA - Red Meat Abattoirs Association
 RPO - Red Meat Producers Organisation
 RTPI - Royal Town Planning Institute

S

SA - South Africa
 SAAPMB - South African Association of Physicists in Medicine and Biology
 SAB - South African Breweries Limited

SABC - South African Broadcasting Corporation
 SACAP - South African Council for the Architectural Professions
 SACPCMP - South African Council for the Property Valuers Profession
 SACPLAN - South African Council of Planners
 SACQSP - South African Council for the Quantity Surveying Profession
 SADC - Southern African Development Community
 SAFA - South African Feedlot Association
 SAFEFE - South African Foundation for Economic and Financial Education
 SAFOI - South African Fryer Oil Initiative
 SAIA - South African Institute of Architects
 SAIM - Society for Industrial and Applied Mathematics
 SAISC - Southern African Institute of Steel Construction
 SANBI - South African National Biodiversity Institute
 SANCID - South African Commission on Irrigation and Drainage
 SANPAD - South African Netherlands Research Programme on Alternatives in Development
 SANSA - South African National Survey of Arachnida
 SAPOA - South African Property Owners Association
 SAPPS - Symposium of the South African Pecan Producers Association
 SAQA - South African Qualifications Authority
 SASA - South African Statistical Association
 SASHS - Southern African Society for Horticultural Sciences
 SASM - South African Society for Microbiology
 SAWMA - South African Wildlife Management Association
 SAWSS - Southern African Weed Science Society
 SCM - Scientific Computing and Modeling
 SEG - Society of Economic Geologists
 SEM - Scanning Electron Microscope

SLE - Senior Lecturer Equivalent
 SSSSA - Soil Science Society of South Africa
 SWMA - Southern African Wildlife Management Association

T

TEM - Transmission Electron Microscope
 THRIP - Technology and Human Resource for Industry Programme

U

UCT - University of Cape Town
 UEC - Unit for Earth Construction
 UFS - University of the Free State
 UJ - University of Johannesburg
 UK - United Kingdom
 UN - United Nations
 UNESCO - United Nations Educational, Scientific and Cultural Organisation
 UNU - United Nations University
 UP - University of Pretoria
 USA - United States of America
 USAID - United States Agency for International Development
 UWC - University of the Western Cape

W

WCAP - World Conference on Animal Production
 WITS - University of the Witwatersrand
 WRC - Water Research Commission

