

ANIMAL PRODUCTION IN AUSTRALIA

PROCEEDINGS OF THE AUSTRALIAN SOCIETY OF ANIMAL PRODUCTION

VOLUME 27

TWENTY-SEVENTH BIENNIAL CONFERENCE

FROM SCIENCE TO APPLICATION

Editors: DG Barber, RT Cowan, CA Anderson and LE Webb

The University of Queensland, Brisbane, 24–27 June 2008
Meeting held jointly with the 68th Annual Conference of the New Zealand Society of Animal Production

10.1071/EAv48n7_prelim

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ISSN 0816-1089

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The criteria for acceptance of papers are that the material is of interest to members, has some novel aspect, is sound, advances scientific knowledge or its application in any field of animal science or animal production, and is presented in a form consistent with instructions to authors. It is also expected that one of the authors of a paper would be present at the conference to present the material as an oral or poster presentation.

ETHICAL CLEARANCE

It is incumbent upon the authors, where necessary, to have had experiments approved by a relevant animal ethics committee.

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PUBLICATIONS AND CITATION OF PAPERS

These papers were presented at the First Joint Conference of the New Zealand Society of Animal Production and the Australian Society of Animal Production, held at The University of Queensland, Brisbane, 23–27 June 2008. Invited plenary and four-page papers submitted in Australia are published in Volume 48(6–7) of the *Australian Journal of Experimental Agriculture*.

Papers should be cited as:

Australian Journal of Experimental Agriculture, **48** (followed by the page numbers).

or in the abbreviated form:

Aust. J. Exp. Agric. **48** (followed by the page numbers).

Papers that were submitted in New Zealand are published in Volume 68 of the *Proceedings of the New Zealand Society of Animal Production*. One-page papers submitted in Australia are published in the *Proceedings of the 27th Biennial Conference of the Australian Society of Animal Production*.

WELCOME FROM THE 27th COUNCIL OF THE AUSTRALIAN SOCIETY OF ANIMAL PRODUCTION

The 27th Biennial Conference in 2008 is unique because for the first time we have joined with the NZ Society of Animal Production for a joint meeting. Both Societies were established to provide a framework for interaction between producers and scientists in the livestock industries. We appreciate the willingness of the Kiwis to join with us to make this a special event. The problems facing both countries in the livestock industries are similar and we also face similar issues with respect to our scientific discipline of an aging scientist population, reduced government funding and poor career structures for young scientists.

Both Societies have traditionally had a strong practical focus and this is continued here as we seek to make science more applied, hence our theme 'From Science to Application'. However, we have taken a deliberate approach to increase the number of invited speakers and to focus strongly on the application of the newer technologies. In the past, the issue was one of fostering the interaction of scientists and farmers but at present we have an issue of the interaction of the more fundamental scientists with those scientists and farmers wishing to apply that knowledge.

The current Federal Council has continued with the publication of the main papers in a high quality refereed journal and we will be among the first publications in the new journal of Animal Production Science. We have also decided to continue our own publication for the one page papers. There is always debate about the value of such a publication but for those of us within the University sector this is a very valuable medium for postgraduate publication. Indeed the first time the Society introduced this in Melbourne in 1978, I was able to publish my first conference abstract and it was an

exciting event for me. If we are to maintain a young scientist base we need to provide a valuable outlet for their work.

The Society faces many challenges not least of which we need to better engage new graduates. Our Council is made up of a mix of old and new faces and this bodes well for the future. A number of Branches have ceased to exist and we are slowly moving towards a single Federal operation but I believe firmly that active Branches should be encouraged. Australia has also established three new Schools of Veterinary Science and this professional degree will attract many people who want to make a career in the livestock industry. This profession has its own Federal body and conference structure and, although many veterinary scientists participate in our Society, it will be a challenge to maintain the relevance of the Australian Society of Animal Production to the members of the veterinary science profession. This is especially important if we are to maintain the link between producers and scientists.

We hope you will enjoy the strong science focus of this meeting and the fresh interaction with the Kiwis who have participated in the development of the conference themes and speakers. At the end of the day the success of the conference will only come about by your active involvement. For the older members, please take time to welcome and encourage our younger scientists. For the younger generation, pluck up the courage and engage the grey brigade. You may be surprised by how delighted they are to see you taking our Society and research into new uncharted waters.

Dennis Poppi
President

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1986	George Alexander Charles Hoani Scott Dolling Ian Lind Johnstone Dennis John Minson William Henry Southcott	2008	David Blair Coates Hugh Dove Peter Thomas Doyle Adrian Roderic Egan Christopher Morris Oldham

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Honorary Members shall be those who, in the opinion of the Council, have rendered eminent service to the Society.

1976	Joseph Phillip Kahler
1980	Clarence James Daley
1982	Ian Neville Southey
1986	John Murray George Andley George Ward
1988	Edward Ben Byers John Terrell Williams
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2000	Gordon Terrell Williams
2002	David Macfie Richard Moss
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2006	Anthony (Tony) Schlink
2008	TBA

THE UNDERWOOD LECTURE

In honour of **Professor E.J. Underwood**, AO, CBE, BSc(Agric)(Hons)(WA), PhD(Cantab), Hon. DRurSc(UNE), Hon. DSc(Wis), Hon. DSc(Agric)(WA), Hon. DSc(Melb), FRS, FAA, FFA, FAIAS, FASAP, Hon. FACVS. Agricultural Scientist 1905 to 1980.

The Lecturers have been:

1984	R.J. Moir
1986	H.J. Lee
1988	I.W. McDonald
1990	A.D. Robinson
1992	J. Stocker
1994	K.W. Entwistle
1996	D.E. Beever
1998	H. Dove
2000	N.F. Suttle
2002	J.E. Vercoe
2004	Professor J.C. MacRea
2006	D. Lindsay and B. Paganoni

The 2008 Underwood Lecturer is: **G. Attwood**

THE McCLYMONT LECTURE

The 22nd Federal Council introduced this lecture to honour **Professor G.L. (Bill) McClymont**, AO, BVSc(Syd), PhD(Cantab), Hon. DRurSc(UNE), FAIAS, FASAP, Foundation Professor (1955 to 1976) of Rural Science at the University of New England, and a pioneer in the development and application of ecological principles to the teaching and practice of agriculture.

The Lecturers have been:

1998	B.E. Norton
2000	A.R. Sykes
2002	G. Grigg
2004	Professor T. Reeves
2006	J. Scott, T. Coventry and H. Sutherland

The 2008 McClymont Lecturers are: **W. Winter and P. Doyle**

THE HARRY STOBBS LECTURE

The 27th Council presented a lecture to honour **Professor H. (Harry) Stobbs**, BSc(Agric), Ph.D. Harry was recognised nationally and internationally for his contributions to our understanding of the plant/animal interaction, particularly his work on understanding grazing behaviour on different sward types in the tropical environment.

The 2008 Harry Stobbs lecturer is: **G. Edwards**



David Blair Coates

B.Rur. Sc. (Hons)

David Coates graduated in Rural Science in 1963 with First Class Honours and a University Medal from the University of New England. David came from a rural background, and after graduating he returned to ‘the bush’, working for 3 years on Camboon Station, Theodore. Here he gained valuable experience in the commercial and practical aspects of the beef industry. This experience stood him in good stead when, in 1966, he was appointed as the first Officer-in-Charge of the CSIRO Narayen Research Station near Mundubbera, SE Queensland. Narayen at that time consisted of an undeveloped block of land, and during David’s term was developed as a research station. He researched pasture improvement and cattle genetics – the latter involving breed comparisons between the newly developed Belmont Red tropically adapted breed and Herefords. Recognition of this experience led to David serving as Chairman of the Australian Africander Belmont Red Association for 3 years.

In 1979, David was appointed Officer-in-Charge at the Kimberley Research Station, Kununurra where he undertook a research program in irrigated grain sorghum agronomy with Mike Foale. One of the successes of this program was that it was the first to break the 10 tonne/ha yield barrier for grain sorghum in Australia.

In 1982, David transferred to the CSIRO Davies laboratory in Townsville. David’s early work in Townsville was on the value of sown tropical pastures for cattle production, and on phosphorus nutrition of pastures and beef cattle. Much of this work was pioneering; for example, although it was known that many of the soils and pastures in northern Australia were deficient in phosphorus, little was known of the quantitative requirements of plants or cattle, or about the practical aspects of overcoming phosphorus deficiency. In the early years, this work involved large grazing trials, initially on Lansdown. Later work involved research across northern Australia in collaboration with many other scientists such as Raymond Jones, Peter Kerridge, Ron McLean and Bill Winter of CSIRO, Joe Miller, Ron Hendricksen and Stephanie White of the Queensland DPI, and John Ternouth of the University of Queensland. These programs made a major contribution to placing northern Australia in the forefront of research in phosphorus for beef cattle in the tropics and subtropics, and consequent rewriting of the phosphorus requirements of grazing cattle in the tropics.

In 1992, David initiated a major new area of research on using faecal near infra-red spectroscopy (NIRS) analysis to diagnose the quality of the diet selected and predict productivity of cattle

grazing the extensive pastures of northern Australia. Although at that time NIRS technology was being used for grain and forage analysis, particularly in southern Australia, faecal NIRS technology was a novel concept. Previous work was limited to a single grazing animal research group in North America. For many years David continued working virtually single-handed to develop this technology, despite considerable scepticism. Through good science, enormous persistence and hard work David was able to prove the validity of the technology and to convince numerous cattle producers across northern Australia of the importance and potential of faecal NIRS technology. This led to a major R&D project supported by Meat and Livestock Australia and involving collaboration with numerous cattle producers, the State Departments (particularly Queensland) across northern Australia and the University of Queensland. As a result faecal NIRS technology is now widely accepted by both scientists and producers as a powerful tool for understanding the diet of grazing cattle and guiding strategic supplementation. For many years David has been a frequent participant at field days, conferences and meetings, always with a strong story on the outcomes of research and their application to the northern cattle industry and always making time to assist producers and colleagues. One measure of David’s commitment and successes to develop faecal NIRS technology has been the interest and support from individual cattle producers across northern Australia with some 800 utilising the services of David’s laboratory to obtain analyses for their own cattle herds. More recently the technology has been commercialised to provide a service to the cattle industry. Benefits to the northern cattle industry flow from the opportunity for improved management of cattle for productivity and profitability, and appropriate and sustainable rangeland vegetation management.

Over four decades David Coates has made a significant contribution to the northern grazing industry in the area of animal nutrition, particularly in phosphorus nutrition and development of faecal NIRS for the nutritional diagnosis of grazing cattle. This is reflected in over 70 scientific publications as well as in numerous reports for industry. The work typified David’s commitment to both good science and the improvement of the beef industry. He has contributed widely to the community in many other aspects. He has been a frequent contributor and participant in the conferences of the Society. The Australian Society of Animal Production is pleased to enrol him as a Fellow of the Society.



Hugh Dove

BAgrSci, DipEd, PhD, FAIAST

Hugh Dove graduated in Agricultural Science from the University of Melbourne in 1968 and completed a Diploma in Education in 1969. He then joined the teaching staff of the Department of Animal Husbandry at Melbourne, headed by Professor Derek Tribe, and during this time completed a PhD on the amino acid nutrition of young lambs, under the supervision of Dr Geoff Pearce. In 1975, Hugh was appointed as a research scientist in CSIRO Plant Industry, Canberra, where he has worked for more than 30 years on the nutrition of grazing animals and the development of software packages for farmers and their advisors.

Hugh's early work in Plant Industry focussed on developing and using isotope-based techniques for estimating milk intake. The techniques were developed mainly for use in lambs and calves, but soon were also applied to piglets and wallabies. The latter work, with Dr Steve Cork, helped overturn the notion that marsupials were 'reproductively less efficient'. In 1982, Hugh was awarded a Menzies Scholarship and a Stapledon Travelling Fellowship to work at the Hill Farming Research Organisation in Scotland. His association with the HFRO (later the Macaulay Institute) has continued ever since and has resulted in his ongoing collaboration with Dr Robert Mayes in developing the use of components of plant cuticular wax as markers for estimating diet selection, herbage and supplement intake and diet digestibility. This work was originally based on the alkanes of plant wax, but has now been extended to include the long-chain alcohols and long-chain fatty acids as plant wax markers. It has had a great impact on our ability to quantify the diet selected from pasture and supplements by grazing animals, and has been used in more than 15 animal species. Hugh is now regarded as an international authority in this field and has collaborated with many colleagues within and outside Australia, using the technique for a wide range of herbivores, both domestic and wild.

In recent years, Hugh has been working on the biology of grazing systems based on winter wheats, which can be used both

for winter grazing and for grain production. He has investigated the management factors influencing the profitability of such systems and in particular has demonstrated conclusively that because wheat forage often contains very high potassium, low magnesium and very low sodium, young sheep grazing winter wheat grow faster if supplemented with magnesium and/or sodium. These growth responses of 20–50% have proved to be highly economic and the supplementation technology has been taken up rapidly in the mixed farming industry. Hugh has been much in demand at farmer workshops or update meetings to discuss these findings.

Since joining the Society in 1970, Hugh Dove has been almost continuously involved with Society committee work at both the Branch and Federal level. He was a Federal Council member from 1984 to 1986 and was the Editor of the 1986 Proceedings. He has had similar involvements with the Australian Institute of Agricultural Science and Technology, of which he is a Fellow, the Nutrition Society of Australia, which in 2007 awarded him their Research Medal, and the Grassland Society of New South Wales. He is the Chairman of the International Advisory Committee for the International Symposia on the Nutrition of Herbivores and is on the Editorial Board of several journals.

The results of Hugh's work have not only been incorporated into the software packages developed by the Canberra group, but also into the feeding standards for Australia and the USA. He has more than 200 scientific publications, over 75% of which are refereed papers, invited reviews or book chapters. He has also contributed to the training of future animal scientists through the supervision of 17 postgraduate students. Since 2002, he has co-edited 'Sheep Nutrition' for CABI and 'Nutrient Requirements of Domesticated Ruminants' for CSIRO Publishing. He was also a member of the committee that produced 'Nutrient Requirements of Small Ruminants' for the National Research Council in the USA. The Australian Society of Animal Production is pleased to enrol him as a Fellow of the Society.



Peter Thomas Doyle
BSc Agric(Hons), PhD

Peter Thomas Doyle was born in Goulburn, NSW and grew up in Perth, WA, graduating from the University of Western Australia with a B.Sc.Agric. (Hons) in 1972. He was awarded a PhD in ruminant nutrition from the same University in 1977 for his research on sulfur nutrition and methionine metabolism in sheep, and continued this research while employed as tutor in the Animal Science Department of the University in 1977–78.

During 1978, Peter commenced as a lecturer in animal science in the School of Agriculture and Forestry, University of Melbourne. From 1980 to 1988 he was a research fellow and senior research fellow in the School. Over this decade, his research focussed on intake regulation in ruminants consuming low to medium quality forages and investigated the effects of supplementation with limiting nutrients and pre-treatments to improve degradability of structural carbohydrates. Peter supervised a number of PhD and Masters students during this time and commenced his involvement with small holder livestock production systems in Asia through projects funded by the Australian Universities International Development Program and the Australian Centre for International Agricultural Research (ACIAR). During his last year in Melbourne, Peter was also a Program Coordinator for ACIAR.

In mid 1988, Peter returned to Western Australia as a senior research officer in the Sheep Industries Branch, Department of Agriculture, a position he held for 6 years. While he had state wide responsibility for nutrition research, Peter also led a team based at Albany. His research programs examined opportunities to use strategic grazing management practices to produce uniform fine wool and supplementation strategies to increase staple strength in spring shorn flocks. These research activities involved multidisciplinary teams and took a systems approach, whereby the effects of animal management practices on pasture production, composition and seed production, on insect populations in pastures, and on susceptibility to wind erosion were measured.

In 1994, Peter was appointed Principal Scientist Dairying in the then Victorian Department of Natural Resources and Environment (subsequently Department of Primary Industries), where he spent the next 14 years. At various times during this period, he was responsible for leading and coordinating dairy research activities across the Department, for 18 months

was Acting Director of the Institute of Sustainable Irrigated Agriculture with over 250 staff and sites at Tatura, Kyabram and Cobram, and managed the Kyabram Dairy Research Centre. Despite these administrative roles, Peter maintained an active role in research across a broad range of projects concerned with nutrient intake by grazing cows, milk production responses to supplementary feeding strategies, producing high selenium milk products and milks with characteristics better suited to processing, water use efficiency on irrigated farms, evaluation of development options available to dairy farms with different resource inventories, and evaluation of the impacts of water price and availability on farm profitability.

Peter has published extensively with over 80 scientific papers in refereed journals, and more than 100 conference papers and reports. He has prepared 17 invited reviews for national and international conferences. Peter was awarded the Dairy Research Foundation, NSW Food Authority Dairy Science Award in 2005, in part for his contributions to promoting a national approach to dairy research and fostering collaboration between research groups. In 2007, Peter was awarded the Public Service Medal for his outstanding public service and leadership within Australia and internationally in the field of animal science, for effective transfer of his knowledge to a broad range of beneficiaries, and in particular for his dedication to assisting young scientists in Australia and in developing countries.

During his time in the State Departments, Peter developed close working relationships with farmers, extension staff and consultants to ensure the relevance of his research and to facilitate adoption. Peter also maintained his interest in smallholder crop–livestock systems and over the years has worked in Thailand, Philippines, Indonesia, India and Sri Lanka. In recent years, he has led a cattle production project in central Vietnam and undertaken reviews and project development activities for ACIAR in Tibet and Pakistan.

Peter has been a member of ASAP since his postgraduate days in the 1970s, contributing regularly, and chairing many sessions at the biennial conference. He was Federal Vice President in 1993–94 and program coordinator for the 1994 biennial conference in Melbourne. The Australian Society of Animal Production is pleased to enrol him as a Fellow of the Society.

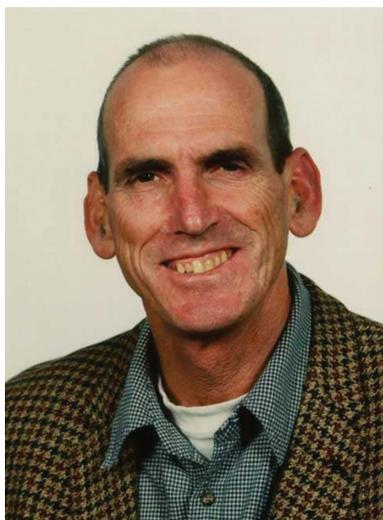


Adrian Roderic Egan
 BSc(Agric), PhD, FAIAST, FTSE

Adrian R. Egan has been an outstanding contributor to Animal Science teaching and research in Australia since graduating with a PhD under the supervision Professor Reg Moir from the University of WA (UWA) in 1964. Adrian was born in Carnavon, WA in 1937, completed his secondary education at Perth Modern School in 1954, and graduated as Bachelor of Agricultural Science from UWA in 1958. After a postdoctoral period in the University of California Davis laboratories of Professor Max Kleiber and Dr Arthur Black, as a member of the 'Davis Tracer Team', he was appointed in 1966 as a lecturer at the University of Adelaide Waite Agricultural Research Institute. There he developed innovative studies of amino acid and protein metabolism in ruminants, and made many significant contributions to an understanding of the relation between nutritional status and intake regulation in sheep. Dr Egan was appointed in 1983 to the Chair of Animal Science at the University of Melbourne, and over subsequent years served as Dean of the Faculty of Agriculture and Forestry, Head, Department of Animal Production and Associate Dean, Research and Postgraduates, Institute of Land and Food Resources until his retirement in 2003. Since then Adrian has been serving the University of Melbourne and University of WA in the role of Emeritus Professor. Professor Egan was awarded the Monsanto Collaborative Medal in 1988, elected as Fellow of both the Australian Institute of Agricultural Science

and Technology and the Australian Academy of Technological Sciences and Engineering in 1990. He was awarded a Centenary Medal by the Australian government in 2003 for his national contribution to Environmental Science and more recently was one of 20 outstanding agricultural scientists to receive a 'Centenary of Agricultural Science' Medal from the University of Melbourne. Throughout his long career he has supervised 56 PhD and research Masters students, published more than 150 papers, reviews, book chapters and books in topics varying from sustainable livestock production management systems (dairy, sheep meat), nutrition–endocrine interrelationships in reproduction and lactation in ruminants to metabolic indices of nutritional status in grazing animals. These studies have been supported by government and industry grants.

He has also made an outstanding contribution to organisation and management of animal science research both overseas and in Australia, and he has been an enthusiastic supporter of the Australian Society of Animal Production, being the only person to serve twice with distinction as Federal President (1992 and 2004). The Australian Society of Animal Production is pleased to enrol Professor Adrian Egan as a Fellow for his outstanding contribution to excellence in research and teaching and for the promotion of animal science in both Australia and in international arenas.



**Christopher
Morris Oldham**
BScAgric, PhD,
FAIAST

Chris Oldham made his name in the 1970s as a reproductive physiologist when he worked on the problems of low fertility of Merino sheep in Western Australia. After graduation in 1970, he joined a group at the University of Western Australia defining the

extent and causes of poor fertility in one of Australia's most important sheep producing regions. He spent the first 6 years of that time as a research officer and then enrolled as a PhD student. After successfully completing his PhD, he spent 2 years in France in 1978–80 at the INRA Station for Reproductive Physiology where his already growing international reputation was firmly established. He played a major role in most of the important practical break-throughs in reproductive physiology in that era. He was a prominent contributor to definitive papers about the effects of strategic feeding of lupins on reproduction, the definition of short cycles in sheep, the spontaneous and induced breeding cycles of Merinos, the 'ram effect', the use of laparoscopy in reproductive research and many other aspects of the breeding of Merino sheep. This suite of studies has both improved our understanding of fundamentals in the field and contributed to the practical development of higher lambing percentages in a breed of sheep that has always had a lower performance than European breeds.

His research then took a dramatic turn when he became the research director of a privately funded research and development foundation, the Martindale Foundation, which was the brainchild of Sir James McCusker, a financier with interests in Agriculture. Oldham studied the use of the deep-rooted perennial leguminous shrub, *Tagasaste*, to make use of hundreds of thousands of hectares of otherwise waste, sandy soils of the Midlands of Western Australia, as a controller of rising groundwater and as a feed resource for sheep and cattle. He developed the programme on a wide front. His group studied the economics, hydrology, genetics, growth forms, harvesting techniques, agronomy and nutritional value of the plant to an extent that this is now an important agricultural plant over vast regions of the poorest soils in Western Australia that had hitherto been largely unproductive. The place of *Tagasaste* is now firmly established, not as first hypothesised as a summer

feed for sheep but as a year-round diet for cattle which are better able to harvest it than sheep and which breed and thrive on the shrub and the plants that grow in the inter-row spaces. At a more fundamental level, his work on *Tagasaste* developed a holistic approach to studying new species and techniques in agricultural systems that has become a model for subsequent work by other scientists in a whole range of agricultural applications.

At the conclusion of the Martindale era, which lasted about 8 years, he joined the WA Department of Agriculture and became part of the CRC for Premium Quality Wool – yet another sharp change in research direction. He began to work on the difficult task of overcoming the problems of tender wool in flocks in the Mediterranean environment of southern Australia. It would be an overstatement to say that most of what is known about this important issue is the result of his studies but he has been the architect of most of the practical solutions that now exist for overcoming the problem of understrength wool. His work in this arena reflected, once again, his broad approach to research and took him from the farm to the wool laboratory to processing plants both here in Australia and overseas.

In yet another career move, he became a leading initiator of the 'Lifetime Wool' program which, to a large extent, combined his skills and experience in wool with his original field of reproductive physiology to study the development of wool-sheep over their lifetime from conception to adulthood. This current work involves researchers from all the southern states of Australia and is, once again, an example of Chris Oldham's capacity to integrate both people and research fields to achieve worthwhile practical outcomes for the Australian animal industries from well conducted research.

In fact, Chris Oldham's career is a rare example of a person who has been prepared to adapt and to contribute to Animal Production at whatever level is necessary to achieve practical solutions. He never had a permanent job in the first 30 years of his working life, surviving on contracts, scholarships, fellowships and grants of varying degrees of solidarity. This has never been a cause for complaint or an excuse for contributing less than 100% of his very considerable capacity – or for seeking safer, more permanent, but duller, employment.

He is an Animal Scientist of extraordinary breadth of interest and achievement for whom success has been its own reward. His steadfast devotion to ASAP as an organisation for integrating science and practice in the animal industries is well known to all its members who attend the biennial conferences. They have witnessed his passionate participation in the scientific sessions and his teasing out information on a wide range of topics through questions, comments and suggestions with no hint of vindictiveness or malice – just sheer enthusiasm. His successful term as National President from 2004 to 2006 is yet another example of extraordinary commitment to this Society and its aims. He is a remarkable role model for students and young scientists with whom he associates readily and wholeheartedly. The Australian Society of Animal Production is pleased to enrol him as a Fellow of the Society.