Poultry Research Foundation

ANNUAL REPORT
2007

UNIVERSITY OF SYDNEY

CONTENTS

OBJECTIVES OF THE FOUNDATION

The objectives of the Poultry Research Foundation are to advise the Senate of the University of Sydney and the Vice-Chancellor on matters associated with poultry research within the University of Sydney and to provide an interface between the Australian poultry and allied industries and the university.

AIMS OF THE FOUNDATION

1. To provide an interface between the poultry and allied industries in Australia and the University of Sydney.
2. To undertake research of relevance to these industries.
3. To assist in the training of scientific and technical personnel to service the private and public sectors of these industries.
4. To act in an industrial liaison capacity.

PRIORITIES 2007

1. Develop links between the University of Sydney and the Poultry CRC
    a. Research projects
    b. Educational programs
    c. Postgraduate scholarships
2. Develop research projects lead by the Chair of Poultry Science
3. Complete infrastructure maintenance of Layer and Deep Litter Sheds
4. Promote postgraduate opportunities within the Poultry Research Foundation
5. Organise the 2006 Australian Poultry Science Symposium

Management of the Foundation is vested in a Council comprising the President, Deputy President and Director, Industry Members in the categories of Governor, Company member and Member, and Honorary Governors and Ex Officio Members.

The administrative office and Research Unit are based at Camden.

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University of Sydney
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Camden, NSW
2570

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Peter Groves, Acting Director
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PRESIDENT'S REPORT

Together, on the February 13th we celebrated the 50th Anniversary of our Poultry Research Foundation of Sydney University. It was a great day with all speakers providing depth and insight into our Foundation, outlining touching memories of the past and positive thoughts for the future. I believe everyone gained something positive out of the day and night. It was a most justified tribute to our Foundation, and the positive sentiment of the day has laid a solid basis upon which our Foundation will progress and contribute over the coming years.

One critically important aspect of our Foundation's future will be the appointment of a new Director. The process to fill this position is underway, the position not only being Director of the Poultry Research Foundation but also an Associate Professor/Senior Lecturer of Poultry Science for Sydney University. Applications have been received and are currently being processed. There is a strong possibility that the position will be filled in time for our 2009 Symposium.

With the global escalation of feed ingredient prices, particularly grain, and the dramatic increase in the proportionate costs associated with poultry feeding, we need more than ever, applied research with a clear commercial focus which is underpinned by sound basic science. With this in mind, it is clear that the Foundation is as relevant today as it ever was, and it is important that it continues to provide an effective forum for exchange of information and collaboration between the Poultry Industry and the University.

I wish to sincerely thank Dr Peter Groves who has been our Acting Director with the departure of Professor Tom Scott. Peter has worked effectively and selflessly for our Foundation, providing solid guidance, common sense, great intellect and a strong research direction. Peter consulted in person with our commercial poultry nutritionists on what they saw as the major issues requiring local research and prepared research projects accordingly. Peter we are in your debt and sincerely on behalf of all stakeholders in our Foundation – we say Thank-You.

Furthermore, I wish to thank Jo-Ann Geist for her wonderful effort in organizing our Celebration day. Jo worked tirelessly, giving long ours to ensure that all the multitude of administrative tasks were completed, in order for the day to come together as a wonderful success. Jo-Ann has the brilliant ability to get things done with good humour, great diplomacy and a captivating smile.

I addition I wish to thank Peter Selle, for his excellent work in editing the proceedings of the Celebration Day. Peter you willingly undertook a most tedious and exacting duty, which was undertaken with great skill and dedication. Thank-you Peter.

Together we move forward! The Poultry Research Foundation has a great Future – meeting the needs of our Poultry Industry. In summary, our Foundation must meet the need for relevant applied research and continue to provide an effective forum for the dissemination of all relevant poultry research…namely our annual Australian Poultry Science Symposium

Linda Browning
April 2008.

ACTING DIRECTOR'S REPORT

I assumed the role of acting director in February 2007 with some trepidation but also with enthusiasm to contribute continuing the valuable work of the Foundation. The role could not have been approached without the enthusiastic help of Foundation members, the President in particular, the researchers and staff of the Poultry Unit and the administrative and guiding assistance from Mrs Jo-Ann Geist. I offer my deep gratitude to for their support and encouragement throughout the year.

The 2007 Australian Poultry Science Symposium attracted its usual high level of interest. The quality of the invited and local speakers again made this Australia's premier poultry science event and its international acclaim continues. The overriding themes were of physiological stress for poultry, focusing on heat stress and skeletal integrity. The symposium remains an invaluable forum for our young researchers to present their research and gain in presentation experience to a quality peer group.

The ventilation system of the deep litter shed was assessed by broiler industry experts and this resulted in some useful modifications and adjustments to the building. This should provide for better conditions and simplified management of the facility in future trial work, making it more able to simulate commercial conditions.

A major part of my involvement with the Foundation this year has been in identifying research opportunities and developing several research proposals for consideration for support from RIRDC and AECL. To facilitate this, meetings with many of the prominent poultry nutritionists within the industry were held with the aim of determining what areas were of most interest and importance to the industry that the facilities and expertise of the Foundation could help meet. Cooperation and enthusiasm was encouraging and four preliminary research proposals were developed and submitted for consideration of support from RIRDC and AECL. One of these has been invited to be submitted as a full research proposal with AECL and will be considered in early 2008 and another has been deferred pending the completion of another study in the same area.

Although we deferred from organising the usual Australian Poultry Science Symposium in 2008 so as not to distract from the World Poultry Conference to be held in that year, we did put an effort into organising a smaller celebratory meeting marking the 50th anniversary of the Foundation. This took considerable inputs in organisation and I thank our hard working organising committee for their efforts and this was rewarded by a well attended and well regarded meeting.

Towards the end of the year the University began advertising for a Director of the Foundation and we are hopeful that the full time position will be filled early in 2008. There are significant challenges ahead but I have faith in the commitment and strong support of the Foundation members in continuing to foster the Foundation's activities and work.

Peter Groves

POULTRY RESEARCH FOUNDATION MEMBERS

Governors

Bartter Enterprises

Inghams Enterprises Pty Ltd

Members

Baiada Poultry Pty Ltd

Danisco Animal Nutrition

Degussa Australia Pty Ltd

Elanco Animal Health

Novus Nutrition Pty Ltd

Phibro Animal Health

Weston Animal Nutrition

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OziBioPharm

The Egg Basket (Sales) Pty. Ltd

POULTRY RESEARCH FOUNDATION COUNCIL

President	Ms. Linda Browning
Deputy President	Ms. Judith O'Keeffe
Director	Dr. Peter Groves (Acting)
Administrative Assistant	Mrs. Jo-Ann Geist

Industry Members

ADM Australia Pty Ltd
Mr. John McLeish

Baiada Poultry Pty. Limited
Mr. Greg Hargreave/Dr. Peter Groves

Batter Enterprises
Mr. Peter J. Bartter / Dr. Tim Walker

Danisco Animal Nutrition
Mr. Roy Frederick/Dr. David Cadogan

Degussa Australia
Mr. Markus Moser

DSM Nutritional Products Pty. Ltd
Ms. Linda Browning

Elanco Animal Health
Mr. Alex Turney

Inghams Enterprises Pty Ltd
Dr. Ron MacAlpine

Novus International Pty Ltd
Mr. David Watson

Phibro Animal Health
Mr. Peter Doyle

Ridley Agriproducts
Ms. Judith O'Keeffe

Weston Animal Nutrition
Mr. Todd Middlebrook

Ex Officio Members

The Chancellor

The Vice Chancellor

Executive Dean – Faculties of Science

The Deans of Agriculture and Natural Resources, and Veterinary Science

The Pro-Dean and Associate Dean for Research, Faculty of Veterinary Science

The Director of the Foundation

A representative, NSW Agriculture

The President, World's Poultry Science Association (Australian Branch)

The Program Manager, RIRDC Chicken Meat Program

The Program Manager, Australian Egg Corporation Ltd

A representative, Australian Egg Industry Association

The Executive Director, Australian Poultry Industry Association

Honorary Governors

Emeritus Professor E. Frank Annison

Dr. Balkar S. Bains

Dr. Derick Balnave

Professor Wayne Bryden

Mr. John Darling

Mr. Ern Newton

STAFF AND STUDENTS

Academic Staff

Dr. P. Groves BVSc. (Sydney) MACVSc. (Epidemiology) PhD (Sydney)

Dr. W.I. Muir, B.Sc.Agr., PhD (Sydney), GradDipEd(UNE)

Dr. J.A. Downing, WDA (Wagga Agr. Col.), B.Sc., PhD (Macquarie)

Honorary Research Fellows

Dr. P.H. Selle, B.V.Sc, PhD (Sydney)

Support Staff

Mrs. R.J. Gill
Mrs. M.E. Hayter
Mrs. N.K. Ganguli
Mrs. J. Geist (Administrative Assistant)

Postgraduate Students

Mr. Mohamed Sayed
Mrs. Elisabeth Ovelgonne

Honours Students (conducted thesis projects in poultry)

This year three fourth year animal production students have conducted thesis projects under supervision of the Poultry Research Foundation.

1. Jerry Liu (Supervisor: Downing) **"The effects of dietary fatty acids on the production performance of Pekin ducks".**
2. Will Taylor, (Supervisor: Downing) **"The effect of strain, pen sex and gender on the growth and development of Pekin duck (*Anas Domesticus*) under commercial conditions in Australia"**
3. Leah Royle (Supervisor: Downing) **"Modeling the potential use of Vitamin E to alleviate the consequences of heat stress in exotics"**.

External Appointments

Peter Groves:

Board Member and Member of the R & D Committee - Australian Poultry CRC
President – Australian Veterinary Poultry Association
Member – National Avian Influenza Vaccination Expert Group
Member – Newcastle Disease National Management Steering Committee
Adjunct Senior Lecturer, Charles Stuart University – Department Agriculture & Veterinary Sciences

Degrees Awarded

Higher degrees were awarded to the following postgraduate students of the Poultry Research Unit during 2007.

Doctor of Philosophy

Nil

Master of Agriculture

Nil

Conference Attendance

Australian Poultry Science Symposium 2007, including presentations by Dr. P.H. Selle, Dr. W.I. Muir and Dr. J.A. Downing

Australasian Pig Science Association 2007, included presentations by Dr. J.A. Downing

AVPA Scientific Meeting 2007, included presentations by Dr. P. Groves

Acknowledgments & Awards

AUSTRALIAN POULTRY SCIENCE SYMPOSIUM - 2007

The 19th annual, combined scientific meeting of the Poultry Research Foundation and the World's Poultry Science Association (Australian Branch) was held on February 12-14th February, 2007. A total of 174 participated in the 2007 APSS. A total of nine invited presentations and 48 contributed presentations were heard at the meeting. Invited speakers and presentation titles, include:

Professor Shlomo Yahav Dept. of Poultry and Aquaculture Sciences The Volcani Center Israel	Thermal manipulation during the perinatal period – does it improve thermotolerance and performance of broiler chickens? The crucial role of ventilation in performance and thermoregulation of the domestic fowl.
Dr. Mark Pines Director of the Institute of Animal Sciences The Volcani Center Israel	Poultry bone disorders The involvement of matrix proteins in eggshell formation.
Dr. Pierre Cronje Cronje Consulting Queensland	Gut health, osmoregulation and resilience to heat stress in poultry
Dr. Carlyle Bennett Manitoba Agriculture, Food and Rural Institute Canada	How to use a hand-held carbon dioxide monitor to evaluate summer ventilation in poultry houses. Opportunities and challenges for extension workers servicing the poultry industry.
Professor Colin Whitehead Roslin Institute United Kingdom	Causes and prevention of bone fracture.
Dr. Stephen Collett University of Georgia USA	Strategies to manage wet litter

Sponsorship of the Symposium (2007) was kindly supplied by:

Speakers Sponsors	Australian Egg Corporation Ltd Australian Poultry CRC Alltech Biotechnology Pty. Limited DSM Nutritional Products Pty. Limited Feedworks Poultry Research Foundation RIRDC Chicken Meat Program
Gold Sponsors	Alltech Biotechnology Pty Ltd DSM Nutritional Products Pty Ltd

Silver Sponsors	Nil
Bronze Sponsors	Adisseo Australia Pty Limited Brisbane Export Corporation Biomin Australia Danisco Animal Nutrition Degussa Australia Pty. Limited Elanco Animal Health
Other Sponsors	JEFO Australia OziBioPharm Taylor & Francis Group

Australian Poultry Science Symposium - 2008

The Australian Poultry Science Symposium will be not be held as such in February 2008 due to the World's Poultry Congress being held in June in Brisbane, this decision was made many years prior between the Poultry Research Foundation and WPSA. A decision was made at the Annual General Meeting in March 2007 that a one day 50th Anniversary Conference would be held to celebrate 50 years of the Poultry Research Foundation. Guest speakers would include past students and members of the Poultry community.

For more than 40 years the Poultry Research Unit at Camden has been very active in both broiler and layer research. Some major achievements during the last decade are listed below. This is a very succinct summary with research findings and industry outcomes listed for each major research area. Organisations that appear in brackets e.g. RIRDC indicate the major source of funding for the research area.

1. Amino Acid Digestibility Studies (RIRDC)

Research Findings

i) Development of an assay model for the determination of endogenous amino acid losses under a continuous feeding regimen using guanidinated proteins.

ii) Comparison of excreta and ileal-based assays to measure amino acid digestibility; the results showed that ileal digesta analysis is more appropriate.

iii) Development of an ileal digestibility assay for routine determination of amino acid digestibility.

iv) Compilation of a database of the apparent ileal amino acid digestibilities of feedstuffs.

v) Development of a method for tryptophan analysis and compilation of ileal tryptophan digestibility of feedstuffs.

vi) Evaluation of feed enzymes on digestible amino acid supply.

vii) Application of digestible amino acids to feed formulation.

Industry Outcomes

- Publication of a database: "Digestible Amino Acids in Poultry Feedstuffs" (RIRDC)
- Favourable cost/benefit analyses of industry outcomes (RIRDC)
- Standardized Ileal Digestibility of Amino Acids in Poultry - International Compilation (Industry)
- Reference data for development of *in vitro* test methodology (Industry)
- Feature article in Feedstuffs (July 3, 2000) "Digestible amino acid values more appropriate than total amino acids".

2. Modulation of lean tissue deposition by dietary fatty acids (RIRDC; ARC)

Research Findings

i) Demonstration that dietary inclusion of n-3 and n-6 fatty acids can reduce carcass fatness.

ii) Demonstration that dietary inclusion of n-3 and n-6 fatty acids can improve feed conversion efficiency.

Industry Outcomes

- Recommendations for inclusion of fatty acids that will optimise growth and feed conversion efficiency.
- Enriched meat and eggs as functional foods (Smart Food Centre, University of Wollongong).

3. Development of a non-invasive test for stress in laying hens (RIRDC)

Research Findings

i) The relationship between corticosterone and catecholamines in egg albumen was established.

ii) Corticosterone and not catecholamine concentrations in egg albumen reflect stress in hens.

Industry Outcome

- Egg albumin concentrations of corticosterone could provide a non-invasive measure of stress in hens.

4. Mucosal immunity in chickens (RIRDC)

Research Findings

i) Identification of the site of precursors of IgA producing cells.

ii) Identification of cytokines involved in regulating secretory IgA.

iii) Investigation of *in ovo* vaccinations.

iv) Investigation of the potential for nutrients to modulate the immune response in chickens.

Industry Outcomes

- Facilitate improved mucosal immunity.
- Development of oral vaccines.

5. Nutritional and toxicological evaluation of transgenic plants (CSIRO Division of Plant Industry)

Research Findings

i) Enrichment of lupins with sulphur containing amino acids.

ii) Insect resistant field peas.

Industry Outcome

- Improved poultry feed sources.

6. Application of feed enzymes (Industry)

Research Findings

i) Antinutritive effects of phytate with regard to energy and protein.

ii) Enzyme combinations and improved nutrient utilization.

Industry Outcome

- Estimation of the value of feed enzymes in modifying feed formulations.

7. Mycotoxins in poultry feeds (ADAB)

Research Findings

i) Contamination of corn by aflatoxin, zearalenone and fumonisins and effects on nutritive value.

ii) Toxicology of ergot alkaloids in poultry.

Industry Outcome

- Improved understanding to reduce the risk posed by mycotoxin contamination of poultry feeds.

8. Egg Shell Quality (RIRDC)

Research Findings

i) Defining conditions for beneficial responses to dietary sodium bicarbonate supplementation.

ii) Influence of intermittent lighting at high temperatures.

Industry Outcome

- Defining conditions for improving egg shell quality

9. Amino acid balance for heat stressed broilers (Industry)

Research Findings

i) Identification of need for increased dietary arginine:lysine ratio.

ii) Interaction of dietary sodium bicarbonate with arginine:lysine ratio.

iii) Influence of dietary arginine:lysine ratio on the relative efficacy of different methionine sources.

Industry Outcomes

- Identification that dietary amino acid balance varies with ambient temperature.
- Defining optimum dietary arginine:lysine ratios.

10. Nutritional requirements of recently imported layer stock (RIRDC)

Research Findings

i) Lysine requirement of ISABrown layers.

ii) Methionine requirement of ISABrown layers.

Industry Outcome

- Defining lysine and methionine requirements of ISABrown laying hens under Australian conditions.

CURRENT RESEARCH PROJECTS

Dr. Jeff Downing:

Dr Jeff Downing is continuing work on the following research projects

1. RIRDC Chicken Meat. Project No: US152A 'Physiological and nutritional approaches to alleviate heat stress in broiler chickens.'
   In the first year of this project two studies were undertaken to investigate

i) The role of antioxidants (vitamin E and Selenium) in alleviating the adverse effects of heat stress in broilers. Diets were supplemented with either vitamin E or selenium or combinations of both antioxidants. We found no significant treatment effect but all physiological measures of stress suggested that the birds were not heat stressed at the treatment temperature of 32^0C.

ii) The effect of early heat conditioning on alleviating adverse effects of heat stress was the second study. In this study broilers of the Cobb and Ross strains were heat conditioned at either day 3, 4 or 5 and at a temperature of 36^0C or 38^0C. Post-graduate student Mohamed Sayed is continuing to analyse the data.

2. RIRDC New Animal Industries- Project No: US150A. Efficient, environment and bird friendly duck Production.
   This project is in its second year. In 2007 we have investigated the effects of strain, sex, pen sex and season on the growth and carcass composition of Pekin ducks. The data will be used to generate a growth model. In year 2, we are investigating aspects of nutrition (protein concentration and grain source) and their interaction with strain.

3 In collaboration with Dr Greg Cronin at the Animal Welfare Centre, Werribee studies continue to investigate the significance to the laying hens of providing furniture (nest box) to conventional cage housing systems.

Dr. Wendy Muir:

Dr Muir has taken twelve months maternity leave from March 2007 but is currently involved with the following collaborative research projects that have been funded by the Australian Poultry CRC:

1. Development of new generation mycoplasma based vaccines involves collaboration with University of Melbourne, CSIRO AAHL Geelong, University of Sydney and Bioproperties Pty Ltd.
   Work at the University of Sydney has been focussed on establishing an ELISA system to identify an effective immune response to the Mycoplasma gallisepticum ts-11 (MG ts-11) vaccine. MG ts-11 specific ELISA's have been established for the antibody isotypes IgG and IgA. Serum, tracheal and nasal washing samples of birds vaccinated with the ts-11 vaccine have been evaluated for anti- MG ts-11 IgG and IgA antibody titres.

2. Oral delivery system for poultry health products in conjunction with PerOs Technologies. This project is in the final report writing stage.

Dr. Peter Selle:

Dr. Peter Selle is currently involved in the following project:
Dephytinisation

By mutual agreement, the RIRDC-funded dephytinisation project, to define the anti-nutritive properties of phytate via the experimental use of dephytinised feed ingredients, was terminated. The phytate contents of sorghum and soyabean meal could be eliminated by mixing a 1:1 slurry of feedstuff and distilled water with citric acid and a liquid phytase feed enzyme. The slurry was mixed at 45°C for 2 hours followed by drying at 65°C for 72 hours.

It was imperative for the project that placebo or sham-treatment of feedstuffs was innocuous. Sorghum was selected as the cereal grain because it contains very little intrinsic phytase activity (unlike wheat) and it is commonly used in Australian broiler diets. However, in sorghum-casein broiler diets both sham-treatment and dephytinisation of sorghum significantly depressed growth performance. In comparison to untreated sorghum, sham-treatment of sorghum reduced weigh gain by 28.2%, feed intake by 21.4% and feed efficiency by 10.1%. Similarly, dephytinisation of sorghum reduced these growth performance parameters by 25.9%, 19.1% and 8.9%, respectively.

Interestingly sham-treatment or dephytinisation of sorghum did not significantly influence energy utilisation (AME). However, sham-treatment and dephytinisation of sorghum significantly depressed nitrogen (N) retention by 8.5% (0.574 versus 0.627) and 7.5% (0.580 versus 0.627), respectively. Thus it seems likely that the depressed growth performance observed with sham-treated and dephytinised sorghum was driven by reduced protein digestibility. This is probably the result of disulphide and non-disulphide cross-linking involving α, β and γ kafirins and the formation of indigestible protein aggregates (Duodu *et al.,* 2003) as a result of "wet cooking", which is inherent in the dephytinisation procedure. While the underlying mechanisms would be different, there was the indication that the dephytinisation procedure had a negative effect on soy protein quality.

The poor digestibility of sorghum protein following "wet cooking" is considered to be a real limitation (Duodu *et al.,* 2003). Thus the possibility is raised that steam-pelleting sorghum-based diets at high temperatures may have an adverse effect on protein/amino acid digestibility.

Reference:

Duodu KG, Taylor RJN, Belton PS, Hamaker BR (2003) Factors affecting sorghum protein digestibility. *Journal of Cereal Science* **38**, 117-131.

RESEARCH COLLABORATION AND INDUSTRY SERVICES

Dr. Peter Groves is involved in ongoing research with Pace Farm and Baiada to monitor laying hens (four strains)

Dr Muir is involved with an ongoing collaborative research project that has been funded by the Australian Poultry CRC on Oral delivery system for poultry health products in conjunction with PerOs Technologies of Canada.

Dr Peter Selle has been working in cooperation with Professor 'Ravi' Ravindran (Massey University, NZ) and Dr Aaron Cowieson (Danisco Animal Nutrition, UK) in the area of phytate and phytase.

Selle PH, Ravindran V (2008) Phytate-degrading enzymes in pig nutrition. *Livestock Science* **113**, 99-122.

Ravindran V, Cowieson AJ, Selle PH (2008) Influence of dietary electrolyte balance and microbial phytase on growth performance, nutrient utilization and excreta quality of broiler chickens. *Poultry Science* 87, 677-688

Cowieson AJ, Ravindran V, Selle PH (2008) Endogenous amino acid flows at the ileal level in broiler chickens are influenced by dietary phytic acid and source of microbial phytase. *Poultry Science* (submitted for publication)

Dr, Jeff Downing is involved in collaboration work as stated above.

COMMUNICATIONS

Publications:

Bryden WL, **Selle PH,** Ravindran V, Acamovic T (2007) Phytate: an anti-nutritive factor in animal diets. In: Poisonous Plants: Global Research and Solutions [KE Planter, TL Wieregna, JA Pfister, eds.] pp. 279-284. CABI Publishing, Oxon. UK.

de Graaf, S.P., Evans, G., Maxwell, W. M. C., **Downing, J.A**. and O'Brien, J.K. 2007) Successful low dose insemination of flow cytometrically sorted ram spermatozoa in sheep. Reproduction in Domestic Animals 42 (6): 648-653.

de Graf, SP., Beilby, K., Osborn, D., **Downing, J.A.**, Maxwell, W.M.C and Downing, J.A. (2007) Embryo production from superovulated sheep inseminated with sex-sorted ram spermatozoa. Theriogenelogy, 67, 550-555.

Downing J.A., Toribio, N. and Giles, L.R. (2007) Induction of oestrus during lactation using an injection of gonadotrophin and piglet separation. Manipulating Pig Production. Australasian Pig Science association, XI, p137.

Kopinski, J., Blaney, B., Murray, S-A and **Downing, J.A.** (2007) Effect of feeding sorghum ergot (Claviceps africana) to sows during mid-lactation on plasma prolactin and litter performance. Journal of Animal Physiology and Animal Nutrition. (accepted)

Kopinski, J., Blaney, B., **Downing J**.**A**., McVeigh,J., and Murray, S-A. Murray, (2007) Feeding sorghum ergot (Claviceps africana) to sows before farrowing inhibits milk production. Australian Veterinary Journal 85 (5): 169-176.

Mikkelsen LL, Vidanarachchi JK, Olnood CG, Bao YM, **Selle PH**, Choct M (2007) Evaluation of potassium diformate in necrotic enteritis challenge model. *Proceedings, Australian Poultry Science Symposium* **19**, 157-160.

Ravindran V, Cowieson AJ, **Selle PH** (2007) The interaction between dietary electrolyte balance and microbial phytase on the performance and nutrient utilization of broiler chickens. *Poultry Science* **86**, (Supplement 1) 674 (Abstr).

Selle PH, Ravindran V (2007) Microbial phytase in poultry nutrition. *Animal Feed Science and Technology* **135**, 1-41.

Selle PH, Gill RJ, Scott TA (2007) Effects of pre-pelleted wheat and phytase supplementation on broiler growth performance and nutrient utilisation. *Proceedings, Australian Poultry Science Symposium* **19**, 182-185.

Selle PH, Ravindran V, Ravindran G, Bryden WL (2007) Effects of dietary lysine and microbial phytase on growth performance and nutrient utilisation of broiler chickens. *Asian-Australasian Journal of Animal Sciences* **20**, 1100-1107.

Wang B, **Downing J.A**, Petocz P, Brand-Miller J, Bryden W.L (2007) Metabolic fate of intravenously administered N-Acetylneuraminic acid-6-14C in newborn piglets. Asia Pacific Journal of Clinical Nutrition 16 (1): 110-115.

Wilkinson, S.J., **Downing, J.A**., Scrimgeour, K., Thompson, P.C., Giles, L.R., Wynn, P.C. and Newman, R.E. (2007) The effect of feeding level on growth, plasma non-esterified fatty acid and urea levels in finisher pigs. Manipulating Pig Production. Australasian Pig Science association, XI, p197.

Invited presentations:

Downing J.A (2007) Australasian Pig Science Association – Manipulating pig production - November.

Groves, P.(2007) AVPA Scientific Meeting – Sydney – February.

Groves, P. (2007) Australian College of Veterinary Scientists – Science Week – Gold Coast July.

Groves, P. (2007) AVPA Scientific Meeting – Glenelg South Australia – November.

Selle, P.(2007) Danisco Animal Nutrition Seminar in conjunction with 16th European Symposium on Poultry Nutrition (WPSA)August 26th, 2007. Strasbourg, France.

The University of Sydney
The Poultry Research Foundation

INCOME STATEMENT
FOR THE YEAR ENDED 31 DECEMBER 2007

	2007 $	2006 $
INCOME		
Memberships & Subscriptions	55,600	51,800
Business Income	9,602	31,687
Symposium Income	74,920	96,751
Interest & Investment Income	10,703	10,510
Other Income	12,081	5,623
Internal Income	-	-
Total Income	**162,906**	**196,371**
EXPENDITURE		
Salaries	90,379	69,653
Consumables	16,970	2,469
Equipment, Repairs & Maintenance	(2,439)	28,139
Services & Utilities	48,505	42,655
Travel, Conferences & Entertainment	3,362	10,520
Contribution to University Areas	(3,129)	507
Other Expenses	(7,632)	16,203
Total Expenditure	**146,016**	**170,146**
Surplus/(Deficit) for the period	16,890	26,226
Accumulated Funds as at 1 January	175,515	149,289
ACCUMULATED FUNDS AS AT 31 DECEMBER	**192,405**	**175,515**

Ian Ford
Finance Director-Faculty Operations

31 March 2008

The University of Sydney
The Poultry Research Foundation

BALANCE SHEET
AS AT 31 DECEMBER 2007

	2007 $	2006 $
Current Assets		
Funds Earning University Pool Interest	191,905	175,015
Cash	500	500
Total Current Assets	192,405	175,515
TOTAL ASSETS	**192,405**	**175,515**
NET ASSETS	**192,405**	**175,515**
Equity		
Accumulated Funds	192,405	175,515
TOTAL EQUITY	**192,405**	**175,515**

NOTES TO THE 2007 FINANCIAL STATEMENTS

1. The Financial Statements have been prepared on a modified accrual accounting basis.
2. All fixed assets are expended in the year of purchase.
3. Employee entitlement for Long Service Leave is held centrally in the University's accounts.
4. Income Tax is not applicable to the activities of The Poultry Research Foundation.
5. Comparative Figures - Variations to comparative figures may have occurred to align with account classification changes made in 2007.

Ian Ford
Finance Director- Faculty Operations

31 March 2008