



World's Poultry Science Association (UK Branch)

Annual Meeting

4-5 April 2011

Provisional Programme and Application Form

Jubilee Campus

Nottingham University

Please **READ** these notes before completing registration form

REGISTRATION One completed form per delegate please. Registration form, accompanied by the appropriate payment to be sent to the BSAS Office. For payment by bank transfer please contact the BSAS Office. Delegates may also register on line WPSA website <http://www.wpsa-uk.com/>

A confirmation including receipt will be issued to all delegates.

CONFERENCE FEE The WPSA Conference registration fee includes the WPSA Proceedings and attendance at all WPSA sessions including the joint WPSA/BSAS Session. Application forms for the discounted rate must be received by 28 February. All authors must register by 14 February. Failure to register by this date may result in the abstract being withdrawn from the programme and not being published in the proceedings.

Students A special low rate conference fee is offered to WPSA Students only.

WPSA delegates are invited to attend the BSAS Hammond Memorial Lecture Monday, 16:00-17:00 hours. BSAS delegates are invited to attend the WPSA Gordon Memorial Lecture, Monday, 17:15-18:15 hours.

STUDENT PROGRAMME All students attending the BSAS/ASF/AVTRW/WPSA Conference are invited to attend the Student Sunday, commencing at 14:00 hours - see application opposite. Only BSAS/ASF/AVTRW student members will be entitled to the FREE Student Sunday package which includes the Sunday/Monday programme, social and meal on Sunday. WPSA student members can attend at a discounted rate of £30.

- Submitting papers and understanding resources for literature reviews
- Overcoming the challenges of writing your thesis
- Statistics (ANOVA and Regression techniques)
- Careers Panel discussion
- BSAS Scholarships

ACCOMMODATION

Accommodation is on campus, Newark Halls, single study ensuite bedrooms B&B includes full English breakfast, coffee and tea supplies in bedroom and toiletries pack. There is also single and double occupancy (but no twin) accommodation in the National College (hotel style bedrooms). Both are within a few minutes walk of the venue.

MEALS The WPSA Conference Dinner and lunch on Monday are booked separately as indicated on the application form. *Teas, coffees and lunch on Tuesday are included in the conference fee. Please inform us if you require vegetarian or other specialised meal.*

MONDAY EVENING

WPSA Conference Dinner is in the National College which is in the vicinity of Jubilee Campus.

PAYMENT We accept payment using the following credit cards: Visa (credit and debit), Mastercard (credit and debit), Maestro, Solo and Amex or you may prefer to pay by cheque, made payable to **BSAS**. JCB cards are not accepted. Please make your payment in £ sterling. Cheques must be drawn on a UK bank.

CANCELLATION 30 days prior to the conference: 75% refund. Within 30 days of the conference: No refund BSAS will not be held responsible for any reason outside their control should the conference not be able to commence or curtailed early.

LOSS or DAMAGE BSAS will not be held responsible for any loss or damage of personal items of the delegates, accompanying persons, or exhibitors or injury at Jubilee Campus, Nottingham University.

CARPARKING FREE car parking is available for delegates on campus.

WIFI ACCESS FREE Wifi access is available in certain communal areas of the campus. You will need a network cable for access from your bedroom.

WPSA SUBSCRIPTION Non - WPSA members may join WPSA (UK Branch), as indicated on the application form and therefore take advantage of the reduced conference fee rate.

We look forward to welcoming you at Jubilee Campus, University of Nottingham

WPSA c/o BSAS, PO Box 3, Penicuik, Midlothian, EH26 0RZ, UK

Tel: +44 (0)131 445 4508 Fax: +44 (0)131 535 3103

Email: bsas@sac.ac.uk <http://www.bsas.org.uk>

For further information visit

<http://www.wpsa-uk.com/>

Venue - Jubilee Campus, Nottingham University
See map on website
<http://http://www.wpsa-uk.com/>

WPSA (UK Branch) ANNUAL MEETING

4th/5th April 2011

The Jubilee Campus, Nottingham University, Nottingham
PROVISIONAL PROGRAMME

Monday 4th April 2011

Pre meeting talks from the Animal Science Forum:

10.30-12.00 **Interplay between Immunity, Endocrinology and Nutrition**

Prof Mark Cook
Prof Tom Humphrey
Prof Pete Kaiser

12.00-13.00 Lunch

13:00 **OPENING WPSA ANNUAL MEETING**

13:00-14:15 **Session 1: Original communications**

13:00 187. Performance and gut health of poultry in the post-antibiotic era when feeding a novel yeast cell wall technology *H Lea, Z Kay, E Burton*

13:15 230. Can a novel bio-available silica reduce lameness in poultry? *F J Short, E Burton, D J Belton, G E Mann, C C Perry*

13:30 260. Does feed withdrawal assist experimental induction of sub-clinical necrotic enteritis in broiler chickens? *G Saleem, N Sparks, J Houdijk, T Acamovic, V Pirizgoliev*

13:45 141. Gene expression changes in the duodenum of broilers infused with *Clostridium perfringens* toxin *S Athanasiadou, M Mitchell, E Clutton, C Low, N Sparks*

14:00 445. Towards improved control of avian pathogenic *Escherichia coli* in poultry *F Dziva*

14.15-15:00 **Short oral introductions to a selection of the poster presentations**

10. Evaluation of isolated Lactobacilli from the gastrointestinal tract of broiler chickens toward their use as probiotic *R M Z Heravi, H Kermanshahi, A Varasteh, A H Mousavi, M Nasiri, M Sanki, S E Lari*

20. The effect of fully functional crops and feed intake control on growth, feed efficiency, mortality and profitability of broilers housed in large, modern, climate controlled houses *D Filmer*

24. Assessment of the intestinal integrity of vaccinated broilers infected with experimental coccidiosis by using 4 different approaches *B Mansoori, M Modirsanei*

39. Effects of the combination of arginine and tryptophan on immune response in broiler chickens challenged with infectious bursal disease vaccine *M Emadi, S Navid, K Kaveh*

44. A new xylanase/betaglucanase enzyme combination improves the performance of turkeys fed wheat/barley- based diets to 16 weeks of age *A Peron, C Gilbert, A Owusu-Asiedu, S Jewell, R Croxall*
46. Identification of single nucleotide polymorphism of PIT-1 gene in meat chickens *Z Rodbari, M Alipanah, C Amirinia, H R Seyedabadi, B Taheri Dezfuli*
47. Association of ApoB1 Gene with body growth and fatness traits in Iranian commercial broiler lines *H R Seyedabadi, C Amirinia, A Javanrouh Aliabad, R Vaez Torshizi, S Savar Sofla, B Taheri Dezfuli*
65. Effect of light regimens on growth performance and carcass quality of broiler chicks *I Al-Homidan*
83. Effect of enzyme supplemented maize-soybean meal based diet on gut pH and performance of broilers *R T S Ofongo, S G Ikoru, E A Iyayi*
158. Effects of vitamin E addition to chicken semen on sperm quality during *in vitro* storage of semen *S Tabatabaei, M Mamoei, A Aghaei*
165. Genetic correlations between feeding behaviour traits and performance traits and the potential for selection for different feeding strategies in broiler lines *J A Howie, S Avendano, B J Tolkamp, I Kyriazakis*
173. Effects of first transition time to feed after hatching and supplemented diets with enzyme, thyme powder and garlic powder on growth performance and intestinal development in broiler chickens *E Demir, K Kilinc*
183. Immunotherapeutic effects of some sugar cane (*Saccharum officinarum* L.) extracts against coccidiosis in industrial broiler chickens *M M Awais, M Akhtar, F Muhammad, A ul Haq, M Irfan Anwar*
64. Effect of enzyme supplementation on metabolisable energy of cereal grain in broiler chickens *H Zarghi, A Golian, H Kermanshahi, H Aghel*
110. Comparison of responses to phytase supplementation by broilers using bone mineralization data of either toe or tibia ash *F Khattak, T Acamovic, O Olukosi*
66. Estimation and modeling true metabolizable energy of sorghum grain for poultry *M Sedghi, M R Ebadi, A Golian, H Ahmadi*
80. Early responses of sodium-dependent phosphate transporter type IIb in broiler chicks to dietary phosphorus intervention *O A Olukosi, S A Adedokun, K A Ajuwon, O Adeola*
172. Effects of *Cichorium intybus* R. on histopathology of jejunal villous of small intestine and performance in broilers *H I Shoorab, J Arshami, A Golian, A Tahmasebi, H R Raji*
164. The effects of additive probiotic on egg and serum chemical composition of laying hens *A Aghaei, J Pourreza, S Tabatabaei, M Chaji*
325. The effect of dietary glycerol on the crop, ileum and caecum microbiota of broiler chickens *L McLean, E Ball, K Thompson*
446. Host pro-inflammatory cytokine response as a fundamental key to host survival or death in ducks and chickens infected with highly pathogenic avian influenza virus *S Kuchipudu, S Dunham, R Nelli, G White, V Coward, M Slomke, I Brown, K Ckow Chang*
442. Quantifying the environmental impacts of UK egg production systems through a Life Cycle Assessment *I Leinonen, A G Williams, J Wiseman, J Guy, I Kyriazakis*

440. A novel approach to the isolation and identification of primary myogenic cells from chicken and duck skeletal muscles *B Bacquero Perez, R K Nelli, K C Chang*
- 15:00-16:00 **Tea and poster viewing. Authors in attendance**
- 16:00-17:00 **HAMMOND MEMORIAL LECTURE Prof Sir John Beddington,**
“Food Security in the 21st Century”
- 17:15 **GORDON MEMORIAL LECTURE Prof Marion Dawkins, Oxford**
“Commercial Scale Assessment of Poultry Welfare”
- 18:15 **Gordon Memorial Reception**
- 20:00 **WPSA ANNUAL DINNER**

Tuesday 5th April 2011

- 08:30 **WPSA (UK Branch) AGM**
- 09:00- 9:30 **Session 2 : Original communications**
- 09:00 161. Assessment and heritabilities of feeding behaviour and performance traits in four different broiler lines *J A Howie, S Avendano, B J Tolkamp, I Kyriazakis*
- 09:15 310. Dense genotyping of previously identified candidate gene loci for eggshell formation uncovers further associations with egg shell quality. *I Dunn, P Wilson, D Waddington, M Bain, M Schmutz, R Preisinger, M Tuiskula-Haavisto, J Vilkki*
- 09:30 -10:30 **Industry session Chairman: Patrick Garland**
Barry Thorp; Current and future issues and opportunities for research in the UK Layer Industry; from a Vet’s perspective
John Sloss; Effects of market forces and consumer demand on the UK broiler industry and the potential role of research and education
- 10:30- 11:00 **Coffee**
- 11.00-12.30 **Joint WPSA/BSAS Session**
Dr Julian Marches; Human metagenomics in the gut
Dr Leluo Guan; Rumen microbial ecology with a particular interest in feed efficiency in cattle.
Dr Imke Mulder; Endocrine and host pathogen interactions
Dr Arjan Narbad; Probiotics in the chicken gut and their impact on the diversity of the microbial flora and on the host's immune response.
- 12:30-13:30 **LUNCH**

13:30-15:00 **Session 3 : Original communications**

- 13:30 254. Can Conditioned Place Preference be used to determine hungry broiler preferences for qualitative or quantitative feed restriction? *L Buckley, V Sandilands, P Hocking, B Tolkamp, R D'Eath*
- 13:45 112. Preference for depth of water in Pekin ducks *G Liste, R D Kirkden, D M Broom*
- 14:00 375. Comparing the behaviour of blind and sighted chickens – a model for investigating the importance of vision *S Collins, B Forkman, H Kristensen, P Sandoe, P Hocking*
- 14:15 125. Quantifying the environmental impacts of UK broiler production systems Life Cycle Assessment *I Leinonen, A G Williams, J Wiseman, J Guy, I Kyriazakis*
- 14:30 415. Neural predictive control of broiler chicken growth *T Demmers, Yi Cao, S Gauss, J Lowe, D Parsons, C Wathes*
- 14:45 103. Assessing the repeatability of a measurement of vitelline membrane strength (VMS) in a white egg laying pedigree population *D Lund, I Dunn, R Preisinger, M Schmutz, M Bain*

15:00-15.30 **Coffee and Poster viewing.**

15:30-17:00 **Session 4 : Original communications**

- 15:30 464. Identifying an optimum $\omega 3:\omega 6$ dietary content to improve bone health for laying hens with minimal impacts on production endpoints *M J Toscano, F Booth, T Cogan, L Williams, J F Tarlton*
- 15:45 205. The effect of dietary crude protein and potassium on water intake and excretion by turkeys *M Waseem Mirza, V Pirgozliev, N Sparks*
- 16:00 242. Effects of incorporating a novel bioethanol co-product in poultry diets on bird performance *D Scholey, N Morgan, P Williams, E Burton (nee Clarke)*
- 16:15 268. The effect of beta-glucanase on the performance of laying hens fed a barley/wheat based diet *H V Masey O'Neill, M R Bedford, N Liu*
- 16:30 333. Evaluation of nutritive value of *Icacina oliviformis* seed meal in broiler chicken diets *H K Dei, R A Adjokatse, S Abdulai, G K Amoako, A Mohammed, G A Teye*
- 16:45 218. Free-range poultry production by agro-pastoral women in northern Nigeria *A Adesehinwa, K Ajala, B I Nwagu, O Saka*
- 17:00 **Presentation of President's prize/s**

Close of meeting

POSTERS

20. The effect of fully functional crops and feed intake control on growth, feed efficiency, mortality and profitability of broilers housed in large, modern, climate controlled houses *D Filmer*
10. Evaluation of isolated Lactobacilli from the gastrointestinal tract of broiler chickens toward their use as probiotic *R M Z Heravi, H Kermanshahi, A Varasteh, A H Mousavi, M Nasiri, M Sanki, S E Lari*
24. Assessment of the intestinal integrity of vaccinated broilers infected with experimental coccidiosis by using 4 different approaches *B Mansoori, M Modirsanei*
39. Effects of the combination of arginine and tryptophan on immune response in broiler chickens challenged with infectious bursal disease vaccine *M Emadi, S Navid, K Kaveh*
44. A new xylanase/betaglucanase enzyme combination improves the performance turkeys fed wheat/barley- based diets to 16 weeks of age *A Peron, C Gilbert, A Owusu-Asiedu, S Jewell, R Croxall*
46. Identification single nucleotide polymorphism of PIT-1 gene in meat chickens *Z Rodbari, M Alipannah, C Amirinia, H R Seyedabadi, B Taheri Dezfuli*
47. Association of ApoB1 Gene with body growth and fatness traits in Iranian commercial broiler lines *H R Seyedabadi, C Amirinia, A Javanrouh Aliabad, R Vaez Torshizi, S Savar Sofla, B Taheri Dezfuli*
64. Effect of enzyme supplementation on metabolisable energy of cereal grain in broiler chickens *H Zarghi, A Golian, H Kermanshahi, H Aghel*
65. Effect of light regimens on growth performance and carcass quality of broiler chicks *I Al-Homidan*
66. Estimation and modeling true metabolizable energy of sorghum grain for poultry *M Sedghi, M Reza Ebadi, A Golian, H Ahmadi*
80. Early responses of sodium-dependent phosphate transporter type IIb in broiler chicks to dietary phosphorus intervention *O A Olukosi, S A Adedokun, K A Ajuwon, O Adeola*
83. Effect of enzyme supplemented maize-soybean meal based diet on gut pH and performance of broilers *R T S Ofongo, S G Ikoru, E A Iyayi*
158. Effects of vitamin E addition to chicken semen on sperm quality during in vitro storage of semen *S Tabatabaei, M Mamoei, A Aghaei*
165. Genetic correlations between feeding behaviour traits and performance traits and the potential for selection for different feeding strategies in broiler lines *J A Howie, S Avendano, B J Tolcamp, I Kyriazakis*
172. Effects of Cichorium intybus R. on histopathology of jejunal villous of small intestine and performance in broilers *H I Shoorab, J Arshami, A Golian, A Tahmasebi, H R Raji*
164. The effects of additive probiotic on egg and serum chemical composition of laying hens *A Aghaei, J Pourreza, S Tabatabaei, M Chaji*

173. Effects of first transition time to feed after hatching and supplemented diets with enzyme, thyme powder and garlic powder on growth performance and intestinal development in broiler chickens *E Demir, K Kilinc*
183. Immunotherapeutic effects of some sugar cane (*Saccharum officinarum* L.) extracts against coccidiosis in industrial broiler chickens *M M Awais, M Akhtar, F Muhammad, A ul Haq, M Irfan Anwar*
325. The effect of dietary glycerol on the crop, ileum and caecum microbiota of broiler chickens *L McLean, E Ball, K Thompson*
446. Host pro-inflammatory cytokine response as a fundamental key to host survival or death in ducks and chickens infected with highly pathogenic avian influenza virus *S Kuchipudu, S Dunham, R Nelli, G White, V Coward, M Slomke, I Brown, K Ckow Chang*
442. Quantifying the environmental impacts of UK egg production systems through a Life Cycle Assessment *I Leinonen, A G Williams, J Wiseman, J Guy, I Kyriazakis*
16. Broken-line, exponential and second order equations in response to estimated methionine and total sulfur amino acid requirements of commercial laying hens during the first cycle of production *Ali A Saki, R N Harsini, M Haghighat, P Zamani*
26. Effect of dietary supplementation of papaya leaf meal, Vitamin D and pineapple skin meal on meat quality of spent layer hens *S Navid, K Kaveh, M Emadi, M Hasiri*
32. Humoral immune responses in broiler breeder hen maintained on diets containing different levels of methionine *S A Hosseini, M Zaghari, H Lotfollahiyan, M Shivazad, H Moraveg, F Afraz, A Mahdavi*
43. Influence of citric acid and microbial phytase on ileal digestibility of some nutrients in broiler chicks *R Nourmohammadi, S M Hosseini, H Farhangfar, P Rowlinson*
45. Effect of probiotic on Salmonella of digestive system of a chicken model *N A Wali, J Beal, V Kuri*
50. Effect of different levels of raw and oven-heated grass pea seed (*Lathyrus sativus*) with multi-enzym supplementation on growth performance of broiler chicks *E Bayat, A Riasi, A Omidi*
56. Effect of tarragon leaves powder and its essential oil on broiler chicks performance *G Sadeghi, F K Gharetappeh*
58. Effects of different levels of Guar meal with and without Beta-Mannanase Hemicell enzyme on performance of commercial leghorn-type laying hens in second-cycle *M Hasani, M Rezaei, Z A Pirsaraei*
73. Zn residue and Ca and P concentration in bone, shell, liver and kidney of laying hens fed Zn supplemented diets *O M O Idowu, I O Fafiola, O O Odugwa, A O Oso*
99. Chemical and nutritional evaluation of raw Baobab (*Adansonia digitata*. L) seed as alternative plant protein in broiler diets *S N Ukachukwu, L S Abdu, O C Onwudike*
101. The effect of hierarchy on the recognition of shape and colour in the domestic fowl *A Campanella, C De Luna*
160. Effects of nutritional dried whey on intestinal flora of laying hens *A Aghaei, J Pourreza, S Tabatabaei, A Mosavi*
162. Effect of oat and enzyme on digestibility of fat and protein in chicken *A Aghaei, J Pourreza, A Sami, S Tabatabaei*
169. Toxicity evaluation of additional *Nigella Sativa* seed extract in the diet of Japanese quail *A Sheikhlar, S Navid*

186. The effects of clay supplementation in diets on broiler chicken performance
Z H Mirabdolbaghi, H Lotfollahian, A Hosseini, F Alemi, A Mahdavi
191. Effect of multi enzyme supplementation of malted sorghum sprout on performance and serum chemistry by broiler chicks
A O Fafiolu, O O Oduguwa, A V Jegede, O M O Idowu, I R Ibhazukor
197. Intestinal mucosa development in broilers fed different forms of enzyme-supplemented maize bran-based diets
B Makanjuola, E Iyayi, A Adesehinwa
204. The nutritional value for broiler chickens of processed *Jatropha curcas* kernel meal
V Pirgozliev, C Jesson, J Brooker
207. The effect of dietary nutrient density on litter quality in turkey production
M W Mirza, V Pirgozliev, N Sparks
216. Effect of different levels of energy in rearing period on some production parameters of LSL layers
M Vafaenia, M Shivazad, H Moraveg, H Gharaghani
222. Performance and humoral immune response of broiler chicks fed diets including ground gate pits with or without medicinal plants
A Mohebbifar, M Toriki
237. Estimation of the genetic parameters and genetic trends of production and reproduction traits in native fowls
M R Sanjabi, F Alemi, M Jafari, A H Ahadi
239. Effect of sodium bentonite on nutrient digestibility of broiler chickens
H Damiri, M Chaji, M Bojarpour, M Eslami, M Mamoei
240. Potential for alcohol co-products from potable and bioethanol sources as protein source in poultry diets
D Scholey, P Williams, E Burton
258. Experimental induction of sub-clinical Necrotic Enteritis in broiler chickens
G Saleem, N Sparks, J Houdijk, V Pirzgoliev
261. Genital stones in rooster
A Farzinpour, H Dadras, C Ebrahimi
262. The effects of different level of oak acorn (*Quercus castanifolia*) with and without soaking on broiler chicks performance from 21 to 42 day of age
H Semnaninejad, A Karimi, Gh A Sadeghi, T Javadi
271. Effects of diet dilution and enzyme supplementation on growth performance and feed:gain cost of broiler chicks
H Hajati, M Rezaei
277. Immune response of laying hens fed diets containing cottonseed meal treated with sodium bentonite
M Azghadi, H Kermanshahi, A Golian, A Tahmasbi, A Gilani
283. Effect of guar meal and α -mannanase on performance and organ weight of broiler chickens
S A Hosseini-Ghaffari, A G Golian, A Tahmasbi, H Kermanshahi
289. The effects of less severe dietary non phytate phosphorus deficiency and phytase supplementation on broiler chicks performance from one to three weeks of age
M M Tabar, A Karimi, GH A Sadeghi, B Kamanghar Bahrami, B Nikhoo
292. The effect of different levels of energy and protein with constant ratio on performance and thyroid hormone in broiler chickens
M Mossavi, M Eslami, M Chaji, M Bojarpour
323. Preliminary studies on the use of a processed product from cassava (*Manihot esculentum*) peel meal and soybean flour as a substitute for wheat bran in broiler diets
H K Dei, K Ibrahim, A Mohammed
326. The potential of chlorophyll based dietary markers to improve egg yolk colour of laying chickens
M R F Lee, H Jones, H Fleming, K P Gibson, V J Theobald, R I Richardson

327. Effect of dietary spent bleaching clay on performance of laying hens
Z Mirabdolbaghi, H Lotfollahiyan, A Mahdavi, S A Hosseini, F Alemi
334. Effect of varying levels of dried sorghum (S. Bicolour) brewery waste on growth performance of broiler chickens *H K Dei, M Quaicoo, A Mohammed*
335. Efficacy of three types of probiotics in growing broiler chicken diets *H K Dei, G Oyeleke, A Mohammed*
338. Evaluation of different levels of Zinc and Betaine substitute to methionine in alleviation of heat stress on performance of broilers *F Salabi, M Boujarpoor, J Fayazi, S Salary, M Nazari*
341. Effects of processed apple peel waste with or without enzyme in grower diets chicken performance *Z H Safar, G Sadeghi, A Karimi, O Azizi*
342. Determination of protein quality and true metabolizable energy of high oil poultry by-product meal *O Kalvandi, H Janmohammadi, Gh Sadeghi*
345. Estimation of genetic and phenotypic (co)variance component of growth and egg production traits in native fowls of Iran(Esfahan) *N H Zadeh, J Fayazi, M B Nasiri, H Roshanfekar, S E Khaniyan*
352. Effects of chemical amendments on litter quality and broiler performance
D Farhadi, F Shariatmadari, B Taheri Dezfuli, H Khosravinia, M A Karimi Torshiz, S M Hosseini
360. Evaluation of genetic trend for body weight trait of Fars Province native chickens before and after inbreeding adjustment *P Deimi, S Alijani, N Pirani, J Shodja*
362. Cowpea (*Vigna unguiculata*) flour as an extender in comminuted guinea fowl (*Numida meleagris*) sausage *H K Dei, V Andoh, J Bawah, G A Teye*
363. Comparison of digesta collection methods for amino acid digestibility measurements in broilers *H Dilley, E Burton*
378. Egg quality traits of the Nigerian local hen fed varying dietary levels of palm kernel cake with added vegetable oil *K Afolabi, A Akinsoyinu, A Ekeocha, R Olajide, B Akinleye*
429. Using conditioned place aversion techniques as a novel tool for measuring affective states: broiler breeders find unpredictable wind aversive *L Dixon, Qing Liu, R D'Eath*
432. Using motivational trade-off paradigms to assess the subjective experience of moderate lameness in broiler chickens *M J Turner, V Sandilands, L Baker, D McKeegan, K M D Rutherford, N H C Sparks*
440. A novel approach to the isolation and identification of primary myogenic cells from chicken and duck skeletal muscles *B Bacquero Perez, R K Nelli, K C Chang*
460. Dietary long chain omega-3 polyunsaturated fatty acids in regulating bone fragility *F Booth, M J Toscano, L J Wilkins, S N Brown, G J Richards, J K Tarlton*
461. Omega-3 (n3) fatty acid supplemented diets reduces bone breakage and increases bone strength in free range laying hens *J F Tarlton, N Avery, L J Wilkins, L Knott*
463. Impact of enhanced biosecurity measures during ‘thinning’ of poultry flocks on *Campylobacter* contamination and subsequent flock colonization *V K Morris, A M Ridley, J Gittins, S Edge, V M Allen*

WPSA
c/o BSAS
PO Box 3
Penicuik
Midlothian EH26 0RZ
United Kingdom

Tel: +44 (0)131 445 4508

Fax: +44 (0)131 535 3103

Email: bsas@sac.ac.uk

www.bsas.org.uk

www.wpsa-uk.com