

CONTENTS

ANIMAL WELL-BEING AND BEHAVIOR

- Production performance, use of nest box, and external appearance of two strains of laying hens kept in conventional and enriched cages
E. E. Onbaşilar, N. Ünal, E. Erdem, A. Kocakaya, and B. Yaranoğlu 559
- Welfare and performance in layers following temporary exclusion from the litter area on introduction to the layer facility
M. Alm, H. Wall, L. Holm, A. Wichman, R. Palme, and R. Tauson 565
- Chronic welfare restrictions and adrenal gland morphology in broiler chickens
Bruno R. Müller, Hisly Any S. Medeiros, Renato S. de Sousa, and Carla F. M. Molento 574
- On-farm comparison of keel fracture prevalence and other welfare indicators in conventional cage and floor-housed laying hens in Ontario, Canada
Mike T. Petrik, Michele T. Guerin, and Tina M. Widowski 579

GENETICS AND GENOMICS

- Robustness to chronic heat stress in laying hens: a meta-analysis
S. Mignon-Grasteau, U. Moreri, A. Narcy, X. Rousseau, T. B. Rodenburg,
M. Tixier-Boichard, and T. Zerjal 586

IMMUNOLOGY, HEALTH, AND DISEASE

- Molecular characterization of multidrug-resistant avian pathogenic *Escherichia coli* isolated from septicemic broilers
Yurong Li, Ligong Chen, Xianjun Wu, and Shuying Huo 601
- Microbial communities present in the lower respiratory tract of clinically healthy birds in Pakistan
Muhammad Zubair Shabbir, Tyler Malys, Yury V. Ivanov, Jihye Park,
Muhammad Abu Bakr Shabbir, Masood Rabbani, Tahir Yaqub, and Eric Thomas Harvill 612
- Cloning, expression, and antigenic characterization of recombinant protein of *Mycoplasma gallisepticum* expressed in *Escherichia coli*
T. S. Rocha, C. Tramuta, S. Catania, A. Matucci, M. G. Giuffrida, C. Baro,
M. Profiti, L. Bertolotti, and S. Rosati 621
- Plexogenic arteriopathy in broiler lungs: Evaluation of line, age, and sex influences
R. F. Wideman, Jr., J. G. Mason, N. B. Anthony, and D. Cross 628
- Survival of turkey arthritis reovirus in poultry litter and drinking water
Sunil K. Mor, Harsha Verma, Tamer A. Sharafeldin, Robert E. Porter, Andre F. Ziegler,
Sally L. Noll, and Sagar M. Goyal 639
- Isolation, identification, and whole genome sequencing of reticuloendotheliosis virus from a vaccine against Marek's disease
Junping Li, Xuan Dong, Chenghuai Yang, Qihong Li, Zhizhong Cui, Shuang Chang,
Peng Zhao, Kangzhen Yu, and Hanchun Yang 643
- Genetic evolution of H5 highly pathogenic avian influenza virus in domestic poultry in Vietnam between 2011 and 2013
Eun-Kyoung Lee, Hyun-Mi Kang, Kwang-Il Kim, Jun-Gu Choi, Thanh Long To,
Tho Dang Nguyen, Byung-Min Song, Jipseol Jeong, Kang-Seuk Choi, Ji-Ye Kim,
Hee-Soo Lee, Youn-Jeong Lee, and Jae-Hong Kim 650
- Effects of *Clostridium butyricum* on growth performance, antioxidation, and immune function of broilers
X. D. Liao, G. Ma, J. Cai, Y. Fu, X. Y. Yan, X. B. Wei, and R. J. Zhang 662
- Diagnosis and sequence analysis of avian leukosis virus subgroup J isolated from Chinese Partridge Shank chickens
Xuan Dong, Peng Zhao, Weihua Li, Shuang Chang, Jianliang Li, Yang Li, Sidi Ju,
Peng Sun, Fanfeng Meng, Juan Liu, and Zhizhong Cui 668

METABOLISM AND NUTRITION

- Effect of coccidia challenge and natural betaine supplementation on performance, nutrient utilization, and intestinal lesion scores of broiler chickens fed suboptimal level of dietary methionine
A. M. Amerah and V. Ravindran.....673
- Effects of growth patterns and dietary protein levels during rearing of broiler breeders on fertility, hatchability, embryonic mortality, and offspring performance
R. A. van Emous, R. P. Kwakkel, M. M. van Krimpen, H. van den Brand, and W. H. Hendriks.....681
- The effects of particle size, milling method, and thermal treatment of feed on performance, apparent ileal digestibility, and pH of the digesta in laying hens
Isabelle Ruhnke, Ilen Röhe, Carolin Krämer, Farshad Goodarzi Borojoni, Fanny Knorr, Anneluise Mader, Erin Schulze, Abdul Hafeez, Konrad Neumann, Rainer Löwe, and Jürgen Zentek.....692
- Effects of glucocorticoid-induced stress on absorption of glycylsarcosine in jejunum of broilers
W. H. Chang, J. J. Li, S. Zhang, A. J. Zheng, J. L. Yuan, H. Y. Cai, and G. H. Liu.....700

MOLECULAR AND CELLULAR BIOLOGY

- DNA methylation and histone modification patterns during the late embryonic and early postnatal development of chickens
Changwu Li, Shuangshuang Guo, Ming Zhang, Jing Gao, and Yuming Guo.....706
- Characterization of primary structure and tissue expression profile of the chicken apical sodium-dependent bile acid transporter mRNA
N. Nakao, H. Kaneda, N. Tsushima, Y. Ohta, and M. Tanaka.....722

PHYSIOLOGY AND REPRODUCTION

- Consequences of different growth rates in broiler breeder and layer hens on embryogenesis, metabolism and metabolic rate: A review
M. Buzala, B. Janicki, and R. Czarnecki.....728
- Effects of the in ovo injection of 25-hydroxycholecalciferol on the yolk and serum characteristics of male and female broiler embryos
A. Bello, M. Nascimento, N. Pelici, S. K. Womack, W. Zhai, P. D. Gerard, and E. D. Peebles.....734

PROCESSING AND PRODUCTS

- Comparison of sampling procedures and microbiological and non-microbiological parameters to evaluate cleaning and disinfection in broiler houses
K. Luyckx, J. Dewulf, S. Van Weyenberg, L. Herman, J. Zoons, E. Vervaet, M. Heyndrickx, and K. De Reu.....740
- Meat quality, oxidative stability and blood parameters from Graylag geese offered alternative fiber sources in growing period
L. W. He, Q. X. Meng, D. Y. Li, Y. W. Zhang, and L. P. Ren.....750
- Combined effects of presalted prerigor and postrigor batter mixtures on chicken breast gelation
Yun-Sang Choi, Hyun-Wook Kim, Ko-Eun Hwang, Dong-Hun Song, Tae-Jun Jeong, Ki-Hong Jeon, Young-Boong Kim, and Cheon-Jei Kim.....758

MANAGEMENT AND PRODUCTION

- Comparison of different sampling types across the rearing period in broiler flocks for isolation of *Campylobacter* spp.
S. Ingresca-Capaccioni, S. González-Bodí, E. Jiménez-Trigos, F. Marco-Jiménez, P. Catalá, S. Vega, and C. Marin.....766
- Using multiple regression, Bayesian networks and artificial neural networks for prediction of total egg production in European quails based on earlier expressed phenotypes
Vivian P. S. Felipe, Martinho A. Silva, Bruno D. Valente, and Guilherme J. M. Rosa.....772

SYMPOSIUM

Avian Reproduction: Foundational Advances and Practical Applications

Ovarian follicle selection and granulosa cell differentiation
A. L. Johnson.....781

Exploring avian deep-brain photoreceptors and their role in activating the neuroendocrine regulation of gonadal development
Wayne J. Kuenzel, Seong W. Kang, and Z. Jimmy Zhou.....786

Inserting random and site-specific changes into the genome of chickens
Ellen Collarini, Philip Leighton, Darlene Pedersen, Bill Harriman, Roy Jacob, Shelley Mettler-Izquierdo, Henry Yi, Marie-Cecile van de Lavoie, and Robert J. Etches.....799

Avian β -defensins expression for the innate immune system in hen reproductive organs
Yukinori Yoshimura.....804

Control of the reproductive axis: Balancing act between stimulatory and inhibitory inputs
Grégory Y. Bédécarrats.....810

The domestic chicken: Causes and consequences of an egg a day
P. A. Johnson, C. S. Stephens, and J. R. Giles.....816

ASSOCIATION NOTES

Nunc Dimittus.....821

Positions Available.....822