

## CONTENTS

### ANIMAL WELL-BEING AND BEHAVIOR

Are peripheral Mott cells an indication of stress or inefficient immunity? Paul F. Cotter .....	1433
Atypical lymphocytes and leukocytes in the peripheral circulation of caged hens Paul F. Cotter .....	1439
The effect of toe trimming on behavior, mobility, toe length and other indicators of welfare in tom turkeys J. Fournier, K. Schwean-Lardner, T. D. Knezacek, S. Gomis, and H. L. Classen .....	1446
Review of rearing-related factors affecting the welfare of laying hens Andrew M. Janczak and Anja B. Riber .....	1454

### GENETICS AND GENOMICS

Genetic parameters of feed efficiency traits in laying period of chickens Jingwei Yuan, Taocun Dou, Meng Ma, Guoqiang Yi, Sirui Chen, Lujiang Qu, Manman Shen, Liang Qu, Kehua Wang, and Ning Yang .....	1470
---	------

### IMMUNOLOGY, HEALTH, AND DISEASE

Genotypic and pathotypic characterization of Newcastle disease virus isolated from racing pigeons in China Mengda Liu, Yajin Qu, Fangkun Wang, Sidang Liu, and Honglei Sun .....	1476
Experimental pathology of T-2 toxicosis and mycoplasma infection on performance and hepatic functions of broiler chickens M. Manafi, N. Pirany, M. Noor Ali, M. Hedayati, S. Khalaji, and M. Yari.....	1483
High natural antibody titers of indigenous chickens are related with increased hazard in confinement E. Wondmeneh, J. A. M. Van Arendonk, E. H. Van der Waaij, B. J. Ducro, and H. K. Parmentier .....	1493
A survey of <i>Mycoplasma gallisepticum</i> and <i>Mycoplasma synoviae</i> with avian influenza H9 subtype in meat-type chicken in Jordan between 2011–2015 Dergham Ahmad Roussan, Ghassan Khawaldeh, and Ibrahim Ali Shaheen.....	1499
<i>Bacillus amyloliquefaciens</i> supplementation alleviates immunological stress in lipopolysaccharide-challenged broilers at early age Y. Li, H. Zhang, Y. P. Chen, M. X. Yang, L. L. Zhang, Z. X. Lu, Y. M. Zhou, and T. Wang .....	1504
Response of layer and broiler strain chickens to parenteral administration of a live <i>Salmonella</i> Typhimurium vaccine Peter J. Groves, Sue M. Sharpe, and Julian M. Cox .....	1512
Changes in expression of an antimicrobial peptide, digestive enzymes, and nutrient transporters in the intestine of <i>E. praecox</i> -infected chickens H. Yin, L. H. Sumners, R. A. Dalloul, K. B. Miska, R. H. Fetterer, M. C. Jenkins, Q. Zhu, and E. A. Wong .....	1521

### METABOLISM AND NUTRITION

Use of re-esterified oils, differing in their degree of saturation and molecular structure, in broiler chicken diets E. Vilarrasa, R. Codony, E. Esteve-Garcia, and A. C. Barroeta .....	1527
Use of combinations of re-esterified oils, differing in their degree of saturation, in broiler chicken diets E. Vilarrasa, F. Guardiola, R. Codony, E. Esteve-Garcia, and A. C. Barroeta .....	1539
Effects of feed form and dietary coarse ground corn on broiler live performance, body weight uniformity, relative gizzard weight, excreta nitrogen, and particle size preference behaviors Y. Xu, C. R. Stark, P. R. Ferken, C. M. Williams, and J. Brake .....	1549

A quantitative study of the interactive effects of glycine and serine with threonine and choline on growth performance in broilers	1557
<b>W. Siegert, H. Ahmadi, A. Helmbrecht, and M. Rodehutscord</b>	
Early intestinal growth and development in poultry	1569
<b>M. S. Lilburn and S. Loeffler</b>	
Contribution of intestinal- and cereal-derived phytase activity on phytate degradation in young broilers	1577
<b>N. K. Morgan, C. L. Walk, M. R. Bedford, and E. J. Burton</b>	
Relationship between wheat characteristics and nutrient digestibility in broilers: comparison between total collection and marker (titanium dioxide) technique	1584
<b>N. Smeets, F. Nuyens, L. Van Campenhout, E. Delezie, J. Pannecouque, and T. Niewold</b>	
Effect of dietary methionine content on growth performance, carcass traits, and feather growth of Pekin duck from 15 to 35 days of age	1592
<b>Q. F. Zeng, Q. Zhang, X. Chen, A. Doster, R. Murdoch, M. Makagon, A. Gardner, and T. J. Applegate</b>	
Evaluation of inclusion level of wheat distillers dried grains with solubles with and without protease or $\beta$ -mannanase on performance and water intake of turkey hens	1600
<b>E. Y. Opoku, H. L. Classen, and T. A. Scott</b>	
Measurement of true ileal phosphorus digestibility in meat and bone meal for broiler chickens	1611
<b>R. K. Mutucumarana, V. Ravindran, G. Ravindran, and A. J. Cowieson</b>	
Using near infrared transmittance to generate sorted fractions of <i>Fusarium</i> -infected wheat and the impact on broiler performance	1619
<b>Michael E. Kautzman, Mark L. Wickstrom, Natacha S. Hogan, and Tom A. Scott</b>	

#### Research Note

Effects of peroxidized corn oil on performance, AME <sub>n</sub> , and abdominal fat pad weight in broiler chicks	1629
<b>I. J. Ehr, B. J. Kerr, and M. E. Persia</b>	

#### PHYSIOLOGY AND REPRODUCTION

Effects of acute and chronic heat stress on plasma metabolites, hormones and oxidant status in restrictedly fed broiler breeders	1635
<b>Jingjing Xie, Li Tang, Lin Lu, Liyang Zhang, Xi Lin, Hsiao-Ching Liu, Jack Odle, and Xugang Luo</b>	
Effect of the presence of hens on roosters sperm variables	1645
<b>S. G. Dávila, J. L. Campo, M. G. Gil, C. Castaño, and J. Santiago-Moreno</b>	

#### PROCESSING AND PRODUCTS

Persistence of fecal shedding of <i>Salmonella Enteritidis</i> by experimentally infected laying hens housed in conventional or enriched cages	1650
<b>Richard K. Gast, Rupa Guraya, Deana R. Jones, and Kenneth E. Anderson</b>	
Relationship between water-holding capacity and protein denaturation in broiler breast meat	1657
<b>B. Bowker and H. Zhuang</b>	
Efficacy of various protein-based coating on enhancing the shelf life of fresh eggs during storage	1665
<b>Cengiz Caner and Muhammed Yüceer</b>	

#### MICROBIOLOGY AND FOOD SAFETY

Effects of preincubation application of low and high frequency ultrasound on eggshell microbial activity, hatchability, supply organ weights at hatch, and chick performance in Japanese quail ( <i>Coturnix coturnix japonica</i> ) hatching eggs	1678
<b>Iskender Yildirim, Ali Aygun, and Durmus Sert</b>	
Efficacy of fumigation with Trans-cinnamaldehyde and eugenol in reducing <i>Salmonella enterica</i> serovar Enteritidis on embryonated egg shells	1685
<b>Indu Upadhyaya, Hsin-Bai Yin, Meera S. Nair, Chi-Hung Chen, Abhinav Upadhyay, Michael J. Darre, and Kumar Venkitanarayanan</b>	
Prevalence and characteristics of <i>Salmonella</i> spp. isolated from commercial layer farms in Korea	1691
<b>Min Chan Im, So Jeong Jeong, Yong-Kuk Kwon, Ok-Mi Jeong, Min-Su Kang, and Young Ju Lee</b>	

Sensory  
Shilpa  
Elizabeth  
**MANAG**  
Housing  
Xiaoli  
Yan  
**ASSOC**  
Position

Sensory impact of chemical and natural antimicrobials on poultry products: a review Shilpa S. Samant, Philip G. Crandall, Corliss O'Bryan, Jody M. Lingbeck, Elizabeth M. Martin, and Han-Seok Seo .....	1699
--	------

#### **MANAGEMENT AND PRODUCTION**

Housing systems interacting with sex and genetic line affect broiler growth and carcass traits Xiaoling Zhao, Wenshi Ren, Paul B. Siegel, Juan Li, Huadong Yin, Yiping Liu, Yan Wang, Yao Zhang, Christa F. Honaker, and Qing Zhu.....	1711
--	------

#### **ASSOCIATION NOTES**

Positions Available.....	1718
--------------------------	------