

ANIMAL PRODUCTION SCIENCE

CONTENTS Volume 59, Issue 12, 2019, 2109–2288

RESEARCH FRONT: SUSTAINABLE ANIMAL AGRICULTURE FOR DEVELOPING COUNTRIES 2017

Foreword i

Methanogenesis in animals with foregut and hindgut fermentation: a review

G. de la Fuente, D. R. Yañez-Ruiz, A. R. Seradj, J. Balcells and A. Belanche 2109–2122

Perspectives on the production of milk on small-holder dairy farms and its utilisation in developing countries

P. C. Wynn, S. S. Godfrey, N. Aslam, H. M. Warriach, S. Tufail, M. Jahan, Z. Batool Naqvi, S. Latif, B. Wang and D. M. McGill 2123–2130

Enzymatic hydrolysis drastically reduces fibre content of palm-kernel expeller, but without enhancing performance in broiler chickens

W. L. Chen, M. F. Jahromi, S. C. L. Candyrine, J. B. Liang, N. Abdullah and Z. Idrus 2131–2137

Effect of vitamin A restriction on carcass traits and blood metabolites in Korean native steers

Dong-Qiao Peng, Jae-Sung Lee, Won-Seob Kim, Young-Shin Kim, Mun-Hee Bae, Yong-Ho Jo, Young-Kun Oh, Youl-Chang Baek, Seong-Gu Hwang and Hong-Gu Lee 2138–2146

Effects of forage species and feeding systems on rumen fermentation, microbiota and conjugated linoleic acid content in dairy goats

Saranpong Thongruang and Pramote Paengkoum 2147–2153

Molecular weight of condensed tannins of some tropical feed-leaves and their effect on *in vitro* gas and methane production

A. Petlum, P. Paengkoum, J. B. Liang, K. Vasupen and S. Paengkoum 2154–2160

Locational relationship between *corpus luteum* and ovulatory follicle on ovaries alters follicular dynamics and progesterone concentrations of Thai indigenous beef cows exhibiting two follicular waves

P. Yama, T. Moonmanee, M. Osathanunkul, J. Jitjumnong and W. Karaphuak 2161–2168

Characteristics of vocalisation in Hanwoo cattle (*Bos taurus coreanae*) under different call-causing conditions

Na Yeon Kim, Seong Jin Kim, Se Young Jang, Hye Jin Seong, Yeong Sik Yun and Sang Ho Moon 2169–2174

Impacts of improved extension services on awareness, knowledge, adoption rates and perceived benefits of smallholder dairy farmers in Pakistan

H. M. Warriach, P. C. Wynn, M. Ishaq, S. Arif, A. Bhatti, S. Latif, A. Kumbher, Z. Batool, S. Majeed, R. D. Bush, T. N. Pasha and D. M. McGill 2175–2183

RESEARCH PAPERS

Physiology, Endocrinology and Reproduction

Progesterone and pregnant mare serum gonadotropin improve the reproductive capacity of long-term non-oestrus replacement gilts

Peng Zheng, Fushuo Huang, Mingjun Ma, Yaguang Tian and He Huang 2184–2190

Supplementing 2 g per day bovine lactoferrin from late gestation until weaning did not improve lactation performance of mixed parity sows

Fan Liu, Jordon Hogg, Susie Kracht, Chris J. Brewster, Dave J. Henman, Rebecca Z. Athorn, Rebecca S. Morrison, Rob J. Smits and Roger G. Campbell 2191–2195

Effect of calorific intake on proteomic composition of colostrum in dairy cows

Hyun Jung Park, Ha Yeon Jeong, Won Young Lee and Hyuk Song 2196–2205

Continued on next page

Evidence for the effect of serotonergic and dopaminergic gene variants on stress levels in horses participating in dressage and harness racing

S. Negro, M. J. Sánchez-Guerrero, E. Bartolomé, M. Solé, M. D. Gómez, A. Membrillo, A. Molina and M. Valera 2206–2211

Feed Quality, Nutritional Value and Toxicology

Effects of reduced-protein diets supplemented with protease in broiler chickens under high stocking density

F. L. Law, I. Zulkifli, A. F. Soleimani, J. B. Liang and E. A. Awad 2212–2221

Effects of nanoparticle chromium mixed with g-polyglutamic acid on the chromium bioavailability, growth performance, serum parameters and carcass traits of pigs

Tu-Fa Lien and Yu-Shan Lan 2222–2229

Effect of dietary fermented oats in different nutrient-density diets on growth performance, nutrient digestibility and ileal microorganisms of weanling pigs

J. W. Park, H. L. Li, J. K. Kim, D. H. Nguyen and I. H. Kim 2230–2235

Effect of reduced dietary non-phytate phosphorus concentration, with or without calcium reduction, in diets supplemented with phytase for weaned piglets from 28 to 63 days of age

A. N. Sélos, J. L. Donzele, R. F. M. O. Donzele, T. R. Castro, E. F. Cardoso, L. N. Rennó and D. A. M. Braga 2236–2244

Effect of type and feeding frequency of high-fibre feeds on intake, total tract digestibility and ruminal fermentation in beef steers fed a high-concentrate diet

A. López, H. O. Coria, M. A. Nazareno, E. M. García, R. A. Distel and J. I. Arroquy 2245–2251

Evaluation of feed restriction effects on mineral metabolism of intact male, female and castrated male goat kids

Paula Fernanda Varella Santos, Carla Joice Härter, Nhayandra Christina Dias e Silva, Rafael Fernandes Leite, Fernanda Oliveira de Miranda Figueiredo, José Maurício Santos Neto, Márcia Helena Machado de Rocha Fernandes, Kléber Tomás de Resende and Izabelle Auxiliadora Molina de Almeida Teixeira 2252–2258

Effect of a mixed silage of king grass (*Cenchrus purpureus*) and forage legumes (*Leucaena leucocephala* or *Gliricidia sepium*) on sheep intake, digestibility and nitrogen balance

A. A. Santana, L. Cheng, D. M. Verdecia, J. L. Ramírez, S. López, M. V. Cisneros, I. Rugoho, T. M. R. Maxwell and O. Al-Marashdeh 2259–2264

Production Systems in Transition

Simple and robust model to estimate liveweight of Ethiopian Menz sheep

Jane Wamatu, Ashraf Alkhtib and Barbara Rischkowsky 2265–2272

Meat Science and Product Quality

Effects of pre-slaughter short-term factors on pork quality

Fotios Mantis, Iosif Bizelis, George K. Symeon and Emmanuel Rogdakis 2273–2279

Technology and Education

A decision-support tool for investment analysis of automated oestrus detection technologies in a seasonal dairy production system

E. B. Thomas, K. A. Dolecheck, T. B. Mark, C. R. Eastwood, B. T. Dela Rue and J. M. Bewley 2280–2287

Corrigendum

Corrigendum to: Effects of forage species and feeding systems on rumen fermentation, microbiota and conjugated linoleic acid content in dairy goats

Saranpong Thongruang and Pramote Paengkoum

[Vol. 59, No. 12 (2019) pp. 2147–2153] 2288