



# 动物营养学报

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百种中国杰出学术期刊 期刊数字影响力 100 强 (学术类期刊)

中国精品科技期刊 中国科学引文数据库 (CSCD) 核心库来源期刊 中国科技核心期刊

中文核心期刊 中国科学评价研究中心权威期刊 (A<sup>+</sup>级)

英国 CAB Abstracts 收录期刊 美国 Chemical Abstracts 收录期刊

第 32 卷 第 7 期 2020 年 7 月

## 目 次

### 综述

- |   |     |     |     |     |
|---|-----|-----|-----|-----|
| 2941 地方猪耐粗饲和肉质性状形成的微生物代谢机制                | 谭碧娥 | 伍树松 | 贺建华 | 印遇龙 |
| 2947 肌肉脂肪沉积的营养调控与分子机制                     | 王寒凝 | 祁 智 | 李雪玲 | 相金柱 |
| 2959 $\omega$ -3 多不饱和脂肪酸营养强化鸡蛋储存期稳定性的研究进展 | 王 浩 | 赵青余 | 张军民 | 秦玉昌 |
| 2966 围产期奶牛能量负平衡营养调控研究进展                   | 张 帆 | 吕于明 | 熊本海 |     |
| 2975 氨基酸调控猪肉品质的研究进展                       | 郑昌炳 | 段叶辉 | 邓小平 | 印遇龙 |
| 2981 微生物、氧化应激与母乳在猪母子一体化营养调控中的作用           | 严佳豪 | 胡睿智 | 王 楹 | 伍树松 |
| 2989 肉鸡肠道微生物及其调控                          | 李淑珍 | 常文环 | 刘国华 | 蔡辉益 |
| 2997 反刍动物瘤胃运动机制、影响因素及其调控                  | 宋 阳 | 沈维军 | 殷 磊 | 赵 渊 |
| 3005 饲用酶制剂在反刍动物生产中的应用概况                   | 吴 爽 | 周玉香 | 贾 柔 | 杨万宗 |
| 3012 放牧家畜采食量的测定                           | 金有顺 | 侯扶江 |     |     |
| 3031 动物胃肠道氨基酸感应与转运                        | 王绿阳 | 李英英 | 李忠鑫 | 杭苏琴 |
| 3039 氧化脂质对机体脂肪沉积的调控作用及机制                  | 杨晓华 | 张枫琳 | 江青艳 | 王松波 |
| 3049 刺五加提取物的生物学功能及其在畜禽生产中的应用              | 张云露 | 谢凯桓 | 贺 喜 | 刘自逵 |
| 3057 香椿提取物生物活性功能的研究进展                     | 杜宝龙 | 万敏艳 | 王 璇 | 唐德富 |
| 3064 发酵麦麸的营养特性及其在畜禽生产中的应用                 | 安济山 | 刘宽博 | 王永伟 | 李爱科 |
| 3072 百里香酚调控动物肠道菌群的可能机制及其在畜禽生产中替代抗生素的应用    | 李振翼 | 彭 芳 | 贺 喜 | 宋泽和 |

### 猪营养与饲料

- |   |     |     |     |     |
|---|-----|-----|-----|-----|
| 3080 不同工艺处理的五倍子替代氧化锌对仔猪生长性能、养分表现、消化率、盲肠微生物区系及腹泻率的影响         | 沈水宝 | 韦 区 | 伍校军 | 农斯伟 |
| 3089 乳铁蛋白对大河乌猪繁殖性能及母猪与仔猪铁营养、血细胞参数、免疫指标和猪 $\beta$ 防御素基因表达的影响 | 蓝林诚 | 李修宇 | 于继英 | 蔡辉益 |
| 3099 甘露寡糖和复合益生菌对断奶仔猪生长性能及肠道形态结构、挥发性脂肪酸含量和菌群结构的影响            | 车丽涛 | 李岑曦 | 徐娜娜 | 张春勇 |
| 3109 低蛋白质饲料中丝氨酸和甘氨酸比例对育肥猪背最长肌氧化应激状态的影响                      | 刘水灵 | 安清聪 | 郭荣富 |     |
|   | 钟晓霞 | 黄 健 | 刘志云 | 周晓容 |
|   | 黄金秀 |     |     |     |
|   | 刘永辉 | 李 响 | 周锡红 | 李凤娜 |

- |      |                                    |            |             |           |            |
|------|------------------------------------|------------|-------------|-----------|------------|
| 3118 | 复合有机酸对断奶仔猪生长性能、血清生化指标、营养物质表观消化率的影响 | 何荣香<br>杨玲  | 吴媛媛<br>欧阳富龙 | 韩延明       | 马玉静<br>贺建华 |
| 3127 | 饲料蛋白质水平对枣庄黑盖猪生长性能、养分表观消化率和胴体品质的影响  | 王彦平<br>谢晋唐 | 王继英<br>朱晓东  | 成建国<br>丁健 | 林松<br>呼红梅  |

### 禽营养与饲料

- |      |   |            |            |            |           |
|------|---|------------|------------|------------|-----------|
| 3135 | 胚蛋给养 N-乙酰-L-谷氨酸对拉萨白鸡种蛋孵化性能和鸡胚肠道形态的影响                              | 王继光<br>齐广海 | 宋志刚<br>张海军 | 武书庚<br>冯静  | 王晶<br>马雪英 |
| 3143 | 吸附剂对饲喂含黄曲霉毒素 B <sub>1</sub> 和 T-2 毒素饲料肉鸡生长性能、器官指数、血清生化指标和抗氧化能力的影响 | 田莎<br>陈宇光  | 孙鑫东<br>贺喜  | 宋泽和        | 吴媛媛       |
| 3154 | 不同分子质量壳聚糖对黄羽肉鸡生长性能、脂质代谢、屠宰性能及肉品质的影响                               | 何雪萍<br>梁翠萍 | 陈静文<br>汪忠艳 | 王润莲<br>刘国清 | 杜炳旺       |
| 3162 | 玉米胚芽粕和玉米干酒糟及其可溶物肉鸭代谢能评定   | 舒维成<br>王建萍 | 曾秋风<br>彭焕伟 | 丁雪梅<br>张克英 | 白世平       |

### 反刍与草食动物营养与饲料

- |      |  |                        |                          |                 |                  |
|------|--|------------------------|--------------------------|-----------------|------------------|
| 3171 | 不同泌乳水平奶牛产奶量、乳成分和环境温湿指数的相关性研究                 | 童津津<br>熊本海             | 张华<br>蒋林树                | 吴富鑫             | 牛慧               |
| 3181 | 氨碱复合处理对水稻秸秆营养成分和瘤胃降解特性的影响                    | 姜明明<br>肖鉴鑫<br>刘大森      | 马玉林<br>王靖俊               | 陈旭<br>卢娜        | 刘帅<br>曹志军        |
| 3190 | 饲料能量水平和养殖环境温湿指数对育肥肉牛生长性能、营养物质表观消化率和血清生化指标的影响 | 牛化欣<br>魏曼琳             | 胡宗福<br>张颖                | 张适<br>张航        | 吴琼<br>王思珍        |
| 3199 | 北京地区不同泌乳水平中国荷斯坦奶牛乳成分模型建立及相关性分析               | 吴富鑫<br>熊本海             | 童津津<br>麻柱                | 张华<br>蒋林树       | 毛胜勇              |
| 3214 | 高产与低产奶牛的乳成分差异及其对乳能量预测模型的影响                   | 牛慧<br>熊本海              | 童津津<br>麻柱                | 张华<br>蒋林树       | 毛胜勇              |
| 3224 | N-氨甲酰谷氨酸对荷斯坦奶公牛氮代谢的影响                        | 孙雪丽<br>张秀江<br>王美美      | 李秋风<br>沈宜钊               | 曹玉凤<br>李建国      | 李树静<br>高艳霞       |
| 3234 | 复合微生态制剂对哺乳期犊牛生长性能及瘤胃微生态区系的影响                 | 陈凤梅<br>牛钟相             | 程光民<br>胡士林               | 张永翠             | 郭建强              |
| 3246 | 不同周龄补饲燕麦干草对犊牛生长发育和行为的影响                      | 李婷婷<br>沈菲              | 马静<br>肖凡                 | 刘帅<br>曹志军       | 陈天宇<br>邵伟        |
| 3255 | 发酵酒糟对育肥牦牛生长性能、养分表观消化率及瘤胃发酵的影响                | 曹广<br>马健<br>彭全辉<br>罗晓林 | 王之盛<br>周芯宇<br>邹华围<br>官久强 | 胡瑞<br>祝伊泉<br>薛白 | 王雪莹<br>汪成<br>王立志 |
| 3263 | 复合菌培养物及酵母 β-葡聚糖对肉羊生长性能与免疫功能的影响               | 刘世雄<br>陈灰              | 李冬芳<br>高民                | 郝凌魁<br>胡红莲      | 于春微<br>刘大程       |
| 3274 | 全收粪法与不同内源指示剂法测定山羊饲料中养分消化率的比较                 | 张晨<br>张桂国              | 李静<br>张崇玉                | 王云鹏             | 张志远              |

3282	青贮时间对再生稻头季全株青贮品质和体外瘤胃发酵特性的影响	邹诗雨 邓攀	陈东 黄胥莱	唐启源 李付强	陈元伟
<b>水产动物营养与饲料</b>					
3291	添加牛磺酸和硒酵母对改善棉籽浓缩蛋白替代条纹锯鲈饲料鱼粉的作用	张静雅 王岩	任幸	李伟业	王力
<b>特种经济动物营养与饲料</b>					
3303	饲料可消化纤维与淀粉比对长毛兔消化道发育、消化酶活性、十二指肠组织形态及盲肠菌群数量的影响	赵飞 田河	丛雪艳 李建涛	杨桂芹	郭东新
3313	蓝狐源约氏乳杆菌菌株 ZJBF004 分离鉴定与体外益生潜能的评价	蔡熙姮 王金铭	刘晗璐 张新宇	张如春 刘超楠	司华哲 李光玉
<b>分子与细胞营养</b>					
3324	早期断奶对仔猪小肠中谷氨酸/谷氨酰胺转运载体表达的影响	王秋菊 胡海燕	崔一喆 武志敏	王梦竹 耿忠诚	贾军峰
3333	植物乳杆菌 DPP8 胆盐水解酶基因在大肠杆菌中的表达及其酶学性质	丁轲 李元晓 王玉琴	段锦 何万领 刘宁	余祖华 张春杰	李旺 丁盼盼
<b>实验方法与实验动物</b>					
3343	2 种纤维素源饲料细胞壁多糖的化学结构及其在猪消化道降解规律的核磁共振研究	杨亚敏 刘强	庄苏	张志静	张子珩
3358	添加菌酶复合制剂发酵玉米秸秆的筛选试验	吴立坡	姜宁	张爱忠	
3365	脂多糖对大鼠乳腺上皮细胞酪蛋白基因表达的影响	田青	SPITZER A J		赵凤启
3374	2 株羊源芽孢杆菌的筛选及其对小鼠肠道生化指标和肠道菌群的影响	张楠驰	王利	魏勇	
<b>研究简报</b>					
3386	2 个纤维水平饲料对 16~23 kg 天津地方黑猪生长性能、营养物质表观消化率和结肠挥发性脂肪酸含量的影响	马文锋 盛志康	郭巴图	郭亮	兰天鑫
3394	白术茯苓多糖复方对断奶仔猪生长性能和免疫功能的影响	陈丽玲 王自蕊	贺琴 游金明	郭晓波	罗博文
3403	饲料粗纤维水平与砂砾对四川白鹅肠道组织形态、纤维分解酶活性及挥发性脂肪酸含量的影响	金灵	罗海凌	高玉云	杨琳
3412	不同添加量的发酵饲料对 1~55 日龄肉鹅生长性能、血清生化指标及免疫指标的影响	牛自康 林勇 刘艳玲	叶成智 周维仁 闫俊书	张鑫蕊 黄健 张忠远	宦海琳 王胜
3420	奶牛全混合日粮常规营养成分含量近红外快速检测模型的构建与应用	曹明月 马爱华	郑爱荣 兰剑	姜渊志 兰尊海	李贤
3428	过瘤胃葡萄糖的瘤胃稳定性及其不同剂量对燕麦干草瘤胃降解特性的影响	王亚品 熊本海	张帆	华登科	蒋林树
3439	黄粉虫不同发育阶段脂肪酸合成关键基因的表达分析	吴玲丽	郑天祥	王圣印	张大羽

### CONTENTS

#### REVIEW

- 2941 Metabolic Mechanism of Coarse Feeding Tolerance and Meat Quality Traits Formation Based on Microbial Metabolism in Local Pigs
- 2947 Nutritional Regulation and Molecular Mechanism of Intramuscular Fat Deposition
- 2959 Storage Stability of  $\omega$ -3 Polyunsaturated Fatty Acid-Enriched Egg: A Review
- 2966 Research Progress on Nutritional Regulation of Negative Energy Balance in Dairy Cows during Transition Period
- 2975 Research Progress of Amino Acid on Nutrition Regulation of Pork Quality
- 2981 Roles of Microbe, Oxidative Stress and Breast Milk in Regulation of Maternal-Child Integrated Nutrition in Swine
- 2989 Intestinal Microbiota of Broiler Chickens and Its Regulation
- 2997 Rumen Movement Mechanism, Influencing Factors and Its Regulation in Ruminants
- 3005 Application Situation of Feeding Enzyme Preparation in Ruminant Production
- 3012 Determination of Feed Intake of Grazing Livestock
- 3031 Amino Acid Sensing and Transport in Animal Gastrointestinal Tract
- 3039 Regulatory Roles and Mechanisms of Oxylipins in Body Fat Deposition
- 3049 Biological Functions of *Acanthopanax senticosus* Extract and Its Application in Livestock and Poultry Production
- 3057 Research Advances in Bioactive Function of *Toona sinensis* Extract
- 3064 Nutritional Properties of Fermented Wheat Bran and Its Application in Animal Production
- 3072 Thymol: Possible Mechanisms of Controlling Intestinal Flora of Animals and Application in Antibiotic Substitution of Livestock and Poultry Production

#### SWINE NUTRITION AND FEED

- 3080 Effects of Different Processing Chinese Gall Instead of Zinc Oxide on Growth Performance, Nutrient Apparent Digestibility, Cecal Microbial Flora and Diarrhea Rate of Piglets
- 3089 Effects of Lactoferrin on Reproductive Performance of *Dahe* Black Sows and Iron Nutrition, Blood Cell Parameters, Immune Indexes and Porcine  $\beta$ -Defensin Gene Expression of Sows and Piglets
- 3099 Effects of Mannan Oligosaccharides and Complex Probiotics on Growth Performance and Intestinal Morphology, Volatile Fatty Acid Contents and Microbial Structure of Weaned Piglets
- 3109 Effects of Serine to Glycine Ratio in Low Protein Diet on Oxidative Stress Status in *Longissimus Dorsi* of Finishing Pigs
- 3118 Effects of Compound Organic Acids on Growth Performance, Serum Biochemical Indicators and Nutrient Apparent Digestibility of Weaning Piglets
- 3127 Effects of Dietary Protein Level on Growth Performance, Nutrient Apparent Digestibility and Carcass Quality of *Zaozhuang Heigai* Pigs

TAN Bi'e, WU Shusong, HE Jianhua, YIN Yulong

WANG Hanning, QI Zhi, LI Xueling, XIANG Jinzhu

WANG Hao, ZHAO Qingyu, ZHANG Junmin, QIN Yuchang

ZHANG Fan, GUO Yuming, XIONG Benhai

ZHENG Changbing, DUAN Yehui, DENG Jinping, YIN Yulong

YAN Jiahao, HU Ruizhi, WANG Ying, WU Shusong

LI Shuzhen, CHANG Wenhuan, LIU Guohua, CAI Huiyi

SONG Yang, SHEN Weijun, YIN Lei, ZHAO Yuan

WU Shuang, ZHOU Yuxiang, JIA Rou, YANG Wanzong

JIN Youshun, HOU Fujiang

WANG Lyuyang, LI Yingying, LI Zhongxin, HANG Suqin

YANG Xiaohua, ZHANG Fenglin, JIANG Qingyan, WANG Songbo

ZHANG Yunlu, XIE Kaihuan, HE Xi, LIU Zikui

DU Baolong, WAN Minyan, WANG Xuan, TANG Defu

AN Jishan, LIU Kuanbo, WANG Yongwei, LI Aike

LI Zhenyi, PENG Fang, HE Xi, SONG Zehe

SHEN Shuibao, WEI Qu, WU Jiaojun, NONG Siwei, LAN Lincheng, LI Xiuyu, YU Jiyong, CAI Huiyi

CHE Litao, LI Cenxi, XU Nana, ZHANG Chunyong, LIU Shuiling, AN Qingcong, GUO Rongfu

ZHONG Xiaoxia, HUANG Jian, LIU Zhiyun, ZHOU Xiaorong, HUANG Jinxiu

LIU Yonghui, LI Xiang, ZHOU Xihong, LI Fengna

HE Rongxiang, WU Yuanyuan, HAN Yanming, MA Yujing, YANG Ling, OUYANG Fulong, HE Jianhua

WANG Yanping, WANG Jiyong, CHENG Jianguo, LIN Song, XIE Jintang, ZHU Xiaodong, DING Jian, HU Hongmei

## POULTRY NUTRITION AND FEED

- 3135 Effects of *in Ovo* Feeding of N-Ncetyl-L-Glutamate on Hatching Performance of Hatching Eggs and Intestinal Morphology of Chicken Embryos for Lhasa White Chickens
- 3143 Effects of Adsorbent on Growth Performance, Organ Indexes, Serum Biochemical Indexes and Antioxidant Capacity of Broilers Fed Diets Contaminated with Aflatoxin B<sub>1</sub> and T-2 Toxin
- 3154 Effects of Different Molecular Weights of Chitosan on Growth Performance, Lipid Metabolism, Slaughter Performance and Meat Quality of Yellow-Feather Broilers
- 3162 Metabolizable Energy Evaluation of Corn Germ Meal and Corn Distillers Dried Grains with Solubles in Meat Ducks

## RUMINANT AND HERBIVORE NUTRITION AND FEED

- 3171 Correlation Analysis on Milk Yield, Milk Composition and Temperature Humidity Index of Dairy Cows with Different Milk Yield
- 3181 Effects of Ammonia-Alkali Compound Treatment on Nutrient Composition and Rumen Degradation Characteristics of Rice Straw
- 3190 Effects of Dietary Energy Level and Ambient Temperature Humidity Index on Growth Performance, Nutrient Apparent Digestibility and Serum Biochemical Indices of Fattening Beef Cattle
- 3199 Establishment and Correlation Analysis of Milk Composition Model of Chinese Holstein Cows with Different Lactation Levels in *Beijing* Area
- 3214 Difference of Milk Composition in High and Low Yield Dairy Cows and Its Influence on Milk Energy Prediction Model
- 3224 Effects of N-Carbamylglutamate on Nitrogen Metabolism of Holstein Bulls
- 3234 Effects of Compound Microecologies on Growth Performance and Rumen Microbiota of Calves in Lactation Period
- 3246 Effects of Oat Hay Supplementation at Different Weeks of Age on Growth and Development and Behavior of Calves
- 3255 Effects of Fermented Distiller's Grains on Growth Performance, Nutrient Apparent Digestibility and Rumen Fermentation of Finishing Yaks
- 3263 Effects of Compound Bacteria Culture and Yeast  $\beta$ -Glucan on Growth Performance and Immune Function of Mutton Sheep
- 3274 Comparison of Determination of Dietary Nutrient Digestibility by Different Endogenous Indicator Methods and Total Feces Collection Method for Goats
- 3282 Effects of Silage Time on Quality and *in Vitro* Rumen Fermentation Characteristics of First Season Ratoon Rice Whole Silage

WANG Jiguang, SONG Zhigang, WU Shugeng, WANG Jing, QI Guanghai, ZHANG Haijun, FENG Jing, MA Xu-eying  
TIAN Sha, SUN Xindong, SONG Ze-he, WU Yuanyuan, CHEN Yuguang, HE Xi  
HE Xueping, CHEN Jingwen, WANG Runlian, DU Bingwang, LIANG Cuiping, WANG Zhongyan, LIU Guoqing  
SHU Weicheng, ZENG Qiufeng, DING Xuemei, BAI Shiping, WANG Jianping, PENG Huanwei, ZHANG Keying

TONG Jinjin, ZHANG Hua, WU Fuxin, NIU Hui, XIONG Benhai, JIANG Linshu  
JIANG Mingming, MA Yulin, CHEN Xu, LIU Shuai, XIAO Jianxin, WANG Jingjun, LU Na, CAO Zhi-jun, LIU Dasen  
NIU Huaxin, HU Zongfu, ZHANG Shi, WU Qiong, WEI Manlin, ZHANG Ying, ZHANG Hang, WANG Sizhen  
WU Fuxin, TONG Jinjin, ZHANG Hua, MAO Shengyong, XIONG Benhai, MA Zhu, JIANG Linshu  
NIU Hui, TONG Jinjin, ZHANG Hua, MAO Shengyong, XIONG Benhai, MA Zhu, JIANG Linshu  
SUN Xueli, LI Qiufeng, CAO Yufeng, LI Shujing, ZHANG Xiujiang, SHEN Yizhao, LI Jianguo, GAO Yanxia, WANG Meimei  
CHEN Fengmei, CHENG Guangmin, ZHANG Yongcui, GUO Jianqiang, NIU Zhongxiang, HU Shilin  
LI Tingting, MA Jing, LIU Shuai, CHEN Tianyu, SHEN Fei, XIAO Fan, CAO Zhijun, SHAO Wei  
CAO Guang, WANG Zhisheng, HU Rui, WANG Xueying, MA Jian, ZHOU Xinyu, ZHU Yixiao, WANG Cheng, PENG Quanhui, ZOU Huawei, XUE Bai, WANG Lizhi, LUO Xiaolin, GUAN Jiuqiang  
LIU Shixiong, LI Dongfang, HAO Lingkui, YU Chunwei, CHEN Hui, GAO Min, HU Honglian, LIU Dacheng  
ZHANG Chen, LI Jing, WANG Yunpeng, ZHANG Zhiyuan, ZHANG Guiguo, ZHANG Chongyu  
ZOU Shiyu, CHEN Dong, TANG Qiyuan, CHEN Yuanwei, DENG Pan, HUANG Xulai, LI Fuqiang

## AQUATIC ANIMAL NUTRITION AND FEED

3291 Influence of Taurine and Selenium Yeast Supplementation on Replacing Fish Meal with Cottonseed Protein Concentrate in Black Sea Bass (*Centropristis striata*) Diet

ZHANG Jingya, REN Xing, LI Weiye, WANG Li, WANG Yan

## SPECIAL ECONOMIC ANIMAL NUTRITION AND FEED

3303 Effects of Dietary Digestible Fiber to Starch Ratio on Digestive Tract Development, Digestive Enzyme Activities, Duodenal Histomorphology and Cecal Bacteria Community Counts of Angora Rabbits

ZHAO Fei, CONG Xueyan, YANG Guiqin, GUO Dongxin, TIAN He, LI Jiantao

3313 Isolation and Identification of *Lactobacillus johnsonii* Strain ZJBF004 from *Alopex lagopus* and Its Probiotic Potential Evaluation *in Vitro*

CAI Xiheng, LIU Hanlu, ZHANG Ruchun, SI Huazhe, WANG Jinming, ZHANG Xinyu, LIU Chaonan, LI Guangyu

## MOLECULAR AND CELLULAR NUTRITION

3324 Effects of Early Weaning on Expression of Glutamate/Glutamine Transporters in Small Intestine of Piglets

WANG Qiuju, CUI Yizhe, WANG Mengzhu, JIA Junfeng, HU Haiyan, WU Zhimin, GENG Zhongcheng, DING Ke, DUAN Jin, YU Zuhua, LI Wang, LI Yuanxiao, HE Wanling, ZHANG Chunjie, DING Panpan, WANG Yuqin, LIU Ning

3333 Expression of Bile Salt Hydrolase Gene from *Lactobacillus plantarum* DPP8 in *Escherichia coli* and Its Enzymatic Properties

## EXPERIMENTAL METHOD AND ANIMAL

3343 A Study of Chemical Structure of Cell Wall Polysaccharides from Two Fibrous Diets and Their Degradation Rule in Digestive Tract of Pigs Using Nuclear Magnetic Resonance Method

YANG Yamin, ZHUANG Su, ZHANG Zhijing, ZHANG Ziheng, LIU Qiang

3358 Screening Experiment of Fermented Corn Stalk with Fungi and Enzyme Mixed Preparation

WU Lipo, JIANG Ning, ZHANG Aizhong

3365 Effects of Lipopolysaccharide on Casein Gene Expression in Rat Mammary Epithelial Cells

TIAN Qing, SPITZER A J, ZHAO Fengqi

3374 Screen of Two Bacterial Strains of *Bacillus* Isolated from Goat and Their Effects on Intestinal Biochemical Indexes and Intestinal Microflora of Mice

ZHANG Nanchi, WANG Li, WEI Yong

## SHORT COMMUNICATION

3386 Effects of Diets with Two Fiber Levels on Growth Performance, Apparent Digestibility of Nutrients and Colonic Volatile Fatty Acid Contents in 16 to 23 kg *Tianjin* Black Pigs

MA Wenfeng, GUO Batu, GUO Liang, LAN Tianxin, SHENG Zhikang

3394 Effects of *Atractylodes macrocephala* and *Poria cocos* Polysaccharide Compound on Growth Performance and Immune Function of Weaned Piglets

CHEN Liling, HE Qin, GUO Xiaobo, LUO Bowen, WANG Zirui, YOU Jinming

3403 Effects of Dietary Fiber Level and Grit on Intestinal Morphology, Cellulolytic Enzyme Activities and Volatile Fatty Acid Contents in *Sichuan* White Geese

JIN Ling, LUO Hailing, GAO Yuyun, YANG Lin

3412 Effects of Fermentation Diets of Different Supplementation on Growth Performance, Serum Biochemical Indexes and Immune Indexes of Meat Geese at 1 to 55 Days of Age

NIU Zikang, YE Chengzhi, ZHANG Xinrui, HUAN Hailin, LIN Yong, ZHOU Weiren, HUANG Jian, WANG Sheng, LIU Yanling, YAN Junshu, ZHANG Zhongyuan

3420 Construction and Application of Near Infrared Reflectance Spectroscopy Rapid Detection Model for Routine Nutritional Components Contents of Total Mixed Ration in Dairy Cattle

CAO Mingyue, ZHANG Airong, LOU Yuanzhi, LI Xian, MA Aihua, LAN Jian, LAN Zunhai

3428 Rumen Stability of Rumen-Protected Glucose and Its Effects of Different Doses on Rumen Degradation Characteristics of Oat Hay

WANG Yapin, ZHANG Fan, HUA Dengke, JIANG Linshu, XIONG Benhai

3439 Expression Analysis of Key Genes Associated with Fatty Acid Synthesis at Different Development Stages of *Tenebrio molitor*

WU Lingli, ZHENG Tianxiang, WANG Shengyin, ZHANG Dayu