



全国中文核心期刊
中国科技核心期刊
中国科学引文数据库来源期刊

ISSN 0366-6964
CODEN CMHPAI

畜牧兽医学报

ACTA VETERINARIA ET ZOOTECHNICA SINICA

CHINESE JOURNAL
OF ANIMAL AND VETERINARY SCIENCES

Vol.53 No.10

2022

中国畜牧兽医学会

CHINESE ASSOCIATION OF ANIMAL
SCIENCE AND VETERINARY MEDICINE

ISSN 0366-6964



10>



畜牧兽医学报

XUMU SHOUYI XUEBAO

第 53 卷 第 10 期 2022 年 10 月

目 次

综 述

- 畜禽肌纤维发育规律及相关基因研究进展 侯任达, 张 润, 侯欣华, 王立贤, 张龙超(3279)
DNA 甲基化在猪胚胎发育过程中的研究进展 甘建宇, 张 芯, 蔡更元, 洪林君, 黄思秀(3287)
幼龄反刍动物瘤胃微生物定植及其营养调控研究进展
赵 旭, 凌玉钊, 王建华, 魏凌云, 焦金真, 贺志雄(3296)
蛋鸡低蛋白日粮研究进展 邱 凯, 常心雨, 车彦卓, 王 晶, 张海军, 齐广海, 武书庚(3305)
细菌附属敏感性: 优化药物治疗的新思路 黄颖然, 叶欣晴, 刘 娟, 于 洋(3316)
毒素-抗毒素系统在细菌生物被膜形成中的作用及调控机制 侯 博, 王晨燕, 周伦江(3326)
家禽疱疹病毒 CRISPR/Cas9 基因编辑最新研究进展
罗 俊, 刘金玲, 郑鹿平, 罗 琴, 滕 蔓(3335)
弓形虫致密颗粒蛋白的生物学功能研究进展 郑晓楠, 李婷婷, 王金磊, 郑文斌, 朱兴全(3345)

遗传育种

- 不同地方猪重要经济性状关联位点 SNP 芯片分型及群体遗传结构研究
..... 陶 璇, 何志平, 梁 艳, 杨雪梅, 雷云峰, 王 言, 胡紫惠, 廖 坤, 肖贤勋,
格 桑, 马贵云, 吉绒丹增, 敖 翔, 吕学斌, 顾以韧(3358)
猪 SNP 液相芯片 10K~50K 基因型填充效果研究
陈 宇, 邱 奥, 张梓鹏, 都鹤鹤, 白俊艳, 王贵江, 罗文学, 倪俊卿, 李 凯, 丁向东(3368)
猪 CPB2 基因可变剪接体的克隆及生物信息学研究
夏博策, 张凯艺, 苗佳坤, 杨 宇, 彭焕祺, 王彦芳, 杨述林(3377)
Hlcs 干扰对 C2C12 细胞成肌成脂分化后糖酵解基因表达的影响
代宇星, 史银银, 温作晨, 罗云燕, 祝雪丽, 郑春婷, 李淑英, 洪 亮,
张建斌, 郭 亮, 蒲 蕾(3391)

结合 GWAS 先验标记信息的肉鸡 RFI 性状全基因组选择研究

- 杜永旺, 黄 超, 王一东, 李 森, 文 杰, 陈智武, 赵桂萍, 郑麦青(3403)
干扰 HNRNPAB 对牛骨骼肌卫星细胞增殖与分化的作用研究
杨 光, 杨 旭, 訾晶晶, 于建杰, 郭 宏, 丁向彬, 刘新峰, 张林林(3412)
基于转录组测序挖掘奶牛乳脂代谢关键候选基因
王川川, 母 童, 冯小芳, 禹保军, 张 娟, 顾亚玲(3421)
miR-138 靶向 PGC-1 α 调控牦牛肌内前体脂肪细胞增殖及分化
冉宏标, 王 会, 柴志欣, 王嘉博, 张 明, 蔡 欣, 钟金城(3434)
基于基因组和系谱信息的不同选配方案效果模拟研究 张鹏飞, 何 俊, 王立贤, 赵福平(3448)

生物技术与繁殖

- 绵羊磷脂酶 C- γ 1 对绵羊卵母细胞体外成熟的影响
刘欣杰, 吴晓雪, 刘素平, 袁利明, 陈 宁, 赛务加甫(3459)
ART3 抑制剂 3-MBA 对小鼠睾丸生精功能的影响
段晨莹, 李 欣, 赵羚均, 许师源, 原开敏, 董智豪, 郭冠华, 王 栋(3470)
可变剪接体 WNT4- β 对山羊卵泡颗粒细胞增殖和激素分泌的影响
王 鹏, 韩海银, 李文韬, 刘子嶷, 储明星, 刘玉芳(3480)

营养与饲料

- 冬季不同饲养模式下哈萨克马肠道菌群多样性研究 高雪丽,李蒙蒙,加尔恒·别建汗,齐·阿拉达尔(3490)
低蛋白日粮补充天冬氨酸对断奶至育肥阶段猪生长性能及肉品质性状的影响 关鹏,王晨昱,胡鲜,何流琴,李建中,李铁军(3500)

预防兽医

- PCV2 复制起始区 DNA 互作蛋白的筛选及 PARP1 蛋白对病毒复制的调控 贾含笑,袁红根,李振,关帅印,张金花,宋云峰(3511)
北京地区犬呼吸道冠状病毒感染状况的监测与分析 肖园,吕艳丽,孙艳争(3522)
猫杯状病毒分离株 VP1 基因序列与致病性分析 刘健,白艺兰,李鑫,桂亚萍,鞠厚斌,龚国华,夏炉明,陈伟锋,朱晓英,常晓静,李增强,唐聪圣,王建,赵洪进(3530)
B 亚型禽偏肺病毒的分离鉴定及致病性研究 于蒙蒙,包媛玲,王素艳,辛子琪,刘鹏,冯笑艳,孟令宅,郭茹,张艳萍,刘长军,祁小乐,李俊平,王笑梅,高玉龙(3540)
产气荚膜梭菌噬菌体鉴定及其环境消减效果评价 吴立婷,刘半红,田源,王娟,包红朵,周艳,庞茂达,王冉,张辉(3550)
鸡源 A 型产气荚膜梭菌致病性及药物疗效分析 瞿江华,安一娜,王婧,王科智,杨静静,高敏,冯岚迪,谭姝瑜,胡艳欣,董彦君(3561)
C 型产气荚膜梭菌外毒素致小鼠肠道损伤的转录组分析 张思雨,王玉炯,曾瑾(3570)
牛源 A 型多杀性巴氏杆菌 *hydA* 基因缺失株的构建及其在小鼠上的交叉保护性分析 杨洋,谢黎卿,胡沛,高丽旭,袁祥,李攀,彭远义,李能章(3582)
弓形虫 4 个假定蛋白基因缺失株的构建及其基本生物功能学研究 王沛,王萌,李婷婷,郑晓楠,梁勤立,陈小庆(3598)
HMGB1 与日本血吸虫病肝炎症和纤维化的相关性分析 钟昊然,侯玲,桂祥,吕荣雪,刘金明,古少鹏,金亚美(3609)

基础兽医

- PK-15 细胞的 *ISG15* 基因敲除促进 PRV 的复制 李琛,何文峰,赵丽娜,凡启,杨国庆,刘慧敏(3621)
ETT2 结构基因 *epePQR* 对禽致病性大肠杆菌生物学特性及致病性的影响 邵颖,傅丹丹,吴晓妍,谷一,宋祥军,涂健,祁克宗(3631)
酵母甘露聚糖肽对致病性大肠杆菌感染小鼠的保护作用 王海迪,蔡钦岭,马瑞,于旻皖,刘卫敏,魏玉西(3642)
C5a-C5aR 轴在鸭疫里氏杆菌感染致鸭肝损伤中的作用 李德龙,王思媛,杨云川,刘泓邑,何忆箫,刘锦琳,高继业,李继祥,陈思怀(3654)

临床兽医

- 犬多层螺旋 CT 肝多期增强扫描技术研究 廖云,郭译文,李翔旭,苏泽楠,蒋怀德,杨德吉,赵艳兵,姚大伟(3667)
低钙胁迫对胎猪脂质代谢的影响 张卓炜,艾强云,何洋,张辉,李英,郭剑英,唐兆新(3675)
普通骨板内固定治疗玩具犬桡尺骨骨折的回顾性分析 马裔寒,袁占奎,石磊,刘敏,王虓,张彬(3685)
基于网络药理学联合 16S rDNA 高通量测序技术分析丹参对感染大肠杆菌小鼠肠道菌群的影响 王乐,陈泓岑,张永红,吴琼,侯佳佳,王天祐,卢天航,黄传发,张华,崔德凤(3695)

研究简报

- 中国荷斯坦奶牛 *RPL23A*、*ACACB* 基因 3 个 SNPs 检测及其与产奶性状的关联分析 吕小青,杨宇泽,赵凤,焦洋,李艳华,杨超,路永强,孙东晓,麻柱,刘林(3712)
勘误 (3694)

ACTA VETERINARIA ET ZOOTECHNICA SINICA
CHINESE JOURNAL OF ANIMAL AND VETERINARY SCIENCES
Published Monthly:
Chinese Association of Animal Science and Veterinary Medicine
Beijing, China
Vol. 53 No. 10 (Oct. 2022)

CONTENTS

REVIEW

- Research Progress on the Pattern of Muscle Fiber Development and Related Genes in Livestock and Poultry HOU Renda, ZHANG Run, HOU Xinhua, WANG Lixian, ZHANG Longchao(3279)
Research Progress of DNA Methylation during Porcine Embryonic Development GAN Jianyu, ZHANG Xin, CAI Gengyuan, HONG Linjun, HUANG Sixiu(3287)
Research Progress on Rumen Microbial Colonization and Nutritional Regulation of Young Ruminants ZHAO Xu, LING Yuzhao, WANG Jianhua, WEI Lingyun, JIAO Jinzhen, HE Zhixiong(3296)
Research Advances on Low-Protein Diets of Laying Hens ... QIU Kai, CHANG Xinyu, CHE Yanzhuo, WANG Jing, ZHANG Haijun, QI Guanghai, WU Shugeng(3305)
Bacterial Collateral Sensitivity: A New Perspective to Optimize Treatments HUANG Yingran, YE Xinqing, LIU Juan, YU Yang (3316)
The Roles and Regulatory Mechanisms of Toxin-antitoxin System in Bacterial Biofilm Formation HOU Bo, WANG Chenyan, ZHOU Lunjiang(3326)
Recent Advances in Engineering Avian Herpesviruses by CRISPR/Cas9-based Gene Editing Technology LUO Jun, LIU Jinling, ZHENG Luping, LUO Qin, TENG Man(3335)
Research Progress on Biological Functions of Dense Granule Proteins of *Toxoplasma gondii* ZHENG Xiaonan, LI Tingting, WANG Jinlei, ZHENG Wenbin, ZHU Xingquan(3345)

ANIMAL GENETICS AND BREEDING

- SNP Genotyping of Important Economic Traits, and Population Genetic Structure in Different Local Pig Breeds TAO Xuan, HE Zhiping, LIANG Yan, YANG Xuemei, LEI Yunfeng, WANG Yan, HU Zihui, LIAO Kun, XIAO Xianxun, GE Sang, MA Guiyun, JIRONG Danzeng, AO Xiang, LÜ Xuebin, GU Yiren(3358)
Study on the Genotype Imputation Effect of 10K-50K Genotype of Pig SNP Liquid Chip CHEN Yu, QIU Ao, ZHANG Zipeng, DU Hehe, BAI Junyan, WANG Guijiang, LUO Wenxue, NI Junqing, LI Kai, DING Xiangdong(3368)
Cloning and Bioinformatics Study of Alternative Splicing Isoforms of Pig CPB2 Gene XIA Boce, ZHANG Kaiyi, MIAO Jiakun, YANG Yu, PENG Huanqi, WANG Yanfang, YANG Shulin(3377)
The Effect of *Hlcs* Interference on Glycolytic Gene Expression in C2C12 Cells after Myogenic Lipogenic Differentiation DAI Yuxing, SHI Yinyin, WEN Zuochen, LUO Yunyan, ZHU Xueli, ZHENG Chunting, LI Shuying, HONG Liang, ZHANG Jianbin, GUO Liang, PU Lei(3391)
Genomic Selection for RFI in Broiler Combining GWAS Prior Marker Information DU Yongwang, HUANG Chao, WANG Yidong, LI Sen, WEN Jie, CHEN Zhiwu, ZHAO Guiping, ZHENG Maiqing(3403)
Effects of Interfering *HNRNPAB* on Proliferation and Differentiation of Bovine Skeletal Muscle Satellite Cells YANG Guang, YANG Xu, ZI Jingjing, YU Jianjie, GUO Hong, DING Xiangbin, LIU Xinfeng, ZHANG Linlin(3412)
Identification of Key Candidate Genes for Milk Fat Metabolism in Dairy Cows Based on Transcriptome Sequencing WANG Chuanchuan, MU Tong, FENG Xiaofang, YU Baojun, ZHANG Juan, GU Yaling(3421)
miR-138 Regulates Proliferation and Differentiation of Intramuscular Preadipocyte by Targeting *PGC-1α* in Yak RAN Hongbiao, WANG Hui, CHAI Zhixin, WANG Jiabo, ZHANG Ming, CAI Xin, ZHONG Jincheng(3434)
Simulation Study on the Effects of Different Mating Schemes Based on Genomic and Pedigree Information ZHANG Pengfei, HE Jun, WANG Lixian, ZHAO Fuping(3448)

ANIMAL BIOTECHNOLOGY AND REPRODUCTION

- Effects of Sheep Phospholipase C-γ1 on *in vitro* Maturation of Sheep Oocytes LIU Xinjie, WU Xiaoxue, LIU Suping, YUAN Liming, CHEN Ning, SAIWU Jiafu(3459)
Effect of ART3 Inhibitor 3-MBA on Spermatogenic Function of Mouse Testis DUAN Chenying, LI Xin, ZHAO Lingjun, XU Shiyuan, YUAN Kaimin, DONG Zhihao, GUO Guanhua, WANG Dong(3470)
Effect of Alternative Splicing *WNT4-β* on Follicular Granulosa Cell Proliferation and Hormone Secretion in Goats WANG Peng, HAN Haiyin, LI Wentao, LIU Ziyi, CHU Mingxing, LIU Yufang(3480)

ANIMAL NUTRITION AND FEEDS

- The Diversity of Gut Microbiota of Kazakh Horses under Different Feeding Modes in Winter GAO Xueli, LI Mengmeng, Jiaerheng • BIEJIANHAN, QI • Aladaer(3490)
Effects of Aspartic Acid Supplementation in Low-protein Diets on Growth Performance and Meat Quality Traits of Pigs from Weaning to Fattening GUAN Peng, WANG Chenyu, HU Xian, HE Liuqin, LI Jianzhong, LI Tiejun(3500)

PREVENTIVE VETERINARY MEDICINE

- Screening of Proteins Interacting with PCV2 Replication Initiation Region and Study on the Regulation of Virus Replication by PARP1 Protein JIA Hanxiao, YUAN Honggen, LI Zhen, GUAN Shuaiyin, ZHANG Jinhua, SONG Yunfeng (3511)
Surveillance and Analysis of Canine Respiratory Coronavirus Infection in Beijing XIAO Yuan, LÜ Yanli, SUN Yanzheng(3522)
VP1 Sequence and Pathogenicity Analysis of Feline Calicivirus Isolates LIU Jian, BAI Yilan, LI Xin, GUI Yaping, JU Houbin, GONG Guohua, XIA Luming, CHEN Weifeng, ZHU Xiaoying, CHANG Xiaojing, LI Zengqiang, TANG Congsheng, WANG Jian, ZHAO Hongjin(3530)
Isolation, Identification and Pathogenicity of Subtype B Avian Metapneumovirus YU Mengmeng, BAO Yuanling, WANG Suyan, XIN Ziqi, LIU Peng, FENG Xiaoyan, MENG Lingzhai, GUO Ru, ZHANG Yanping, LIU Changjun, QI Xiaole, LI Junping, WANG Xiaomei, GAO Yulong(3540)
Identification and Environmental Inhibition Effect of *Clostridium perfringens* Phage WU Liting, LIU Banhong, TIAN Yuan, WANG Juan, BAO Hongduo, ZHOU Yan, PANG Maoda, WANG Ran, ZHANG Hui(3550)
Investigation on Pathogenicity and Drug Efficacy of *Clostridium perfringens* Type A ZANG Jianghua, AN Yina, WANG Jing, WANG Kezhi, YANG Jingjing, GAO Min, FENG Landi, TAN Shuyu, HU Yanxin, DONG Yanjun(3561)
Transcriptome Analysis of Intestinal Injury Induced by *Clostridium perfringens* Type C Exotoxin in Mouse ZHANG Siyu, WANG Yujiong, ZENG Jin(3570)
Construction of Bovine *Pasteurella multocida* Type A *hyaD* Mutant and Its Cross-protection Analysis in Mice YANG Yang, XIE Liqing, HU Pei, GAO Lixu, YUAN Xiang, LI Pan, PENG Yuanyi, LI Nengzhang(3582)
Generation and Basic Functional Characterization of Four Hypothetical Protein Genes Deletion Strains of *Toxoplasma gondii* WANG Pei, WANG Meng, LI Tingting, ZHENG Xiaonan, LIANG Qinli, CHEN Xiaoqing(3598)
The Correlation of HMGB1 with Liver Inflammatory Fibrosis Induced by *Schistosoma japonicum* ZHONG Haoran, HOU Ling, GUI Xiang, LÜ Rongxue, LIU Jinming, GU Shaopeng, JIN Yamei(3609)

BASIC VETERINARY MEDICINE

- Effect of Interferon Stimulated Gene 15 Knockout in PK-15 Cell Line on Replication of Pseudorabies Virus LI Chen, HE Wenfeng, ZHAO Lina, FAN Qi, YANG Guoqing, LIU Huimin(3621)
Effect of the ETT2 Structural Gene *epePQR* on the Biological Properties and Pathogenicity of Avian Pathogenic *Escherichia coli* SHAO Ying, FU Dandan, WU Xiaoyan, GU Yi, SONG Xiangjun, TU Jian, QI Kezong(3631)
Protective Effect of Yeast Mannatide on Mice Infected with Pathogenic *Escherichia coli* WANG Haidi, CAI Qinling, MA Rui, YU Minhuan, LIU Weimin, WEI Yuxi(3642)
Role of C5a-C5aR Axis in Liver Injury of Ducklings Caused by *Riemerella anatipestifer* Infection LI Delong, WANG Siyuan, YANG Yunchuan, LIU Hongyi, HE Yixiao, LIU Jinlin, GAO Jiye, LI Jixiang, CHEN Sihuai(3654)

CLINICAL VETERINARY MEDICINE

- Multiphasic Contrast-enhanced Multi-slice Spiral CT Scanning Technology of Liver in Dogs LIAO Yun, GUO Yiwen, LI Lingxu, SU Zenan, JIANG Huaide, YANG Deji, ZHAO Yanbing, YAO Dawei(3667)
Effects of Low Calcium Stress on Lipid Metabolism in Fetal Pigs ZHANG Zhuowei, AI Qiangyun, HE Yang, ZHANG Hui, LI Ying, GUO Jianying, TANG Zhaoxin(3675)
Retrospective Analysis of Conventional Bone Plate Internal Fixation in the Treatment of Radius and Ulna Fractures in Toy-breed Dogs MA Yihan, YUAN Zhankui, SHI Lei, LIU Min, WANG Xiao, ZHANG Bin(3685)
Effects of *Radix Salviae Miltiorrhizae* on Intestinal Microflora of *Escherichia coli* Infected Mice Based on Network Pharmacology and 16S rDNA High-throughput Sequencing Technology WANG Le, CHEN Hongcen, ZHANG Yonghong, WU Qiong, HOU Jiajia, WANG Tianyi, LU Tianhang, HUANG Chuanfa, ZHANG Hua, CUI Defeng(3695)

RESEARCH NOTES

- Detection of 3 SNPs of *RPL23A*, *ACACB* Genes and Their Association with Milk Production Traits in Chinese Holstein Cows LÜ Xiaoqing, YANG Yuze, ZHAO Feng, JIAO Yang, LI Yanhua, YANG Chao, LU Yongqiang, SUN Dongxiao, MA Zhu, LIU Lin(3712)

《畜牧兽医学报》第六届编辑委员会成员

顾问 [张子仪] 刘守仁 吴常信 夏咸柱 刘秀梵

主任委员 陈焕春

副主任委员 阎汉平 汪 明 苏振环 时建忠

编委成员 (按姓名英文字母/汉字笔画排序)

Chris Anderson David Lindsay Graham Gardner W.Bruce Currie

马月辉 王加启 方维焕 宁宜宝 卢德勋 朱士恩 朱兴全 刘湘涛 余锐萍

杜立新 戴于明 陆承平 陈溥言 陈瑶生 李 奎 李庆章 李学伟 李德发

沙玉圣 张 涌 张仲秋 张家骅 沈建忠 杨 宁 罗绪刚 孟庆翔 郑友民

周继勇 姜 平 赵兴绪 赵茹茜 夏国良 涂长春 郭万柱 黄维义 崔治中

童光志 蒋小松 舒鼎铭

名誉主编 陈幼春 蒋金书

主编 文杰

副主编 张 沣 时建忠 汪 明 杨汉春 于康震 王立贤 任 鹏

编辑部主任 孟 培

主编 文杰

广告部主任 程金华 本期责任编辑 白永平

畜牧兽医学报

(月刊,1956年创刊)

2022年 第53卷 第10期

2022年10月23日出版

ACTA VETERINARIA ET ZOOOTECHNICA SINICA

(Monthly, Started in 1956)

Vol. 53 No. 10 2022

Published on Oct. 23, 2022

主 管	中国科学技术协会	Supervised by	China Association for Science and Technology
主 办	中国畜牧兽医学会	Sponsored by	Chinese Association of Animal Science and Veterinary Medicine
编 辑	《畜牧兽医学报》编委会	Edited by	Editorial Board of the ACTA VETERINARIA ET ZOOOTECHNICA SINICA
	中国农业科学院北京畜牧兽医研究所		Institute of Animal Science, Chinese Academy of Agricultural Sciences
地 址	北京海淀区圆明园西路2号	Address	No.2 West Road Yuanmingyuan, Haidian Beijing, China. Post Code 100193
邮 编	100193	Telephone	010-62815987 62816996 62893836
电 话	010-62815987 62816996 62893836	Website	http://www.xmsyxb.com
网 址	http://www.xmsyxb.com	E-mail	xmsyxb@caas.cn
电子邮箱	xmsyxb@caas.cn	Published by	Chinese Journal of Animal Science and Veterinary Medicine Co.,Ltd
出版单位	《中国畜牧兽医杂志》有限公司	Printed by	Beijing Kexin Printing Co.,Ltd
印 刷	北京科信印刷有限公司	Distributed by	Domestic Beijing Post Office, China Post Group Corporation Overseas China International Book Trading Corporation, P.O.Box 399
国内总发行	中国邮政集团公司北京市报刊发行局		
国外总发行	中国国际图书贸易集团有限公司 (中国国际书店) 北京399信箱		
订 购	全国各地邮局		
中国标准连续出版物号	ISSN 0366-6964 CN 11-1985/S		

国内定价:50.00 元(全年 600 元)

邮发代号:82-453 国外代号:M446

广告发布登记证号:京海工商广登字20170255号