



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 ZOOECHNICA SINICA

CHINESE JOURNAL
OF ANIMAL AND VETERINARY SCIENCES

Vol.54 No.2

2023

中国畜牧兽医学会

CHINESE ASSOCIATION OF ANIMAL
SCIENCE AND VETERINARY MEDICINE

ISSN 0366-6964



02>



畜牧兽医学报

XUMU SHOUYI XUEBAO

第 54 卷 第 2 期 2023 年 2 月

目 次

综 述

单细胞转录组测序技术及其在动物繁殖中的应用进展

刘源壹,李昕俞,巴音那木拉,翠芳,芒来,杜明(421)

猪繁殖与呼吸综合征抗病育种研究进展 刘铃,王丹丹,崔凯,马月辉,蒋琳(434)

DNA 甲基化在哺乳动物卵母细胞和早期胚胎发育中的研究进展

杨小耿,张慧珠,李键,向华,何翊闳(443)

牛体外胚胎冷冻保存的研究进展

冯肖艺,徐茜,张航,杨柏高,张培培,郝海生,杜卫华,朱化彬,崔凯,赵学明(451)

MicroRNA 调控抗病毒免疫和病毒复制 王岚,何明宇,张敏,丁军涛(463)

姜黄素调控肠道菌群及抗病毒作用研究进展 卓儒浩,柳清扬,钟翔(473)

脂多糖致牛糖脂代谢异常研究进展

樊磊,莘余,尤留超,田欣宇,罗皓,王辛,张婷婷,沈留红(484)

NLRP1 炎性小体的激活机制 何豪杰,薛美,冯力(494)

可转移黏菌素耐药基因 *mcr*:控制革兰阴性菌感染“最后一道防线”的严峻挑战

胡俊,丁帅帅,魏述永(504)

遗传育种

大型迪庆藏猪不同生长阶段背脂与腹脂质代谢差异基因及调控网络分析

王琳,马黎,张博,邓俊,张浩,欧阳晓芳,严达伟,董新星(520)

全基因组关联分析揭示白羽肉鸡孵化性状的遗传基础

张高猛,丁纪强,刘昱宏,郑麦青,文杰,赵桂萍,李庆贺(534)

METTL16 在鸡不同类型肌肉中的表达规律及其对肌肉功能的调控作用

庞立川,单艳菊,刘一帆,章明,甘达峰,屠云洁,姬改革,巨晓军,束婧婷,邹剑敏(545)

基于全基因组 SNP 标记分析中国地方鸡品种的遗传多样性和种群结构

高超群,曹然然,杜文萍,胡晓玉,雷艳茹,李文婷,康相涛(554)

苏尼特羔羊褐色脂肪鉴定及特征研究 方勤圆,付绍印,王标,何小龙,何江峰,王力伟,

陈欣,张林,王大清,张立岭,刘永斌(563)

SNP 芯片评估柯尔克孜羊群体遗传多样性和遗传结构 李隐侠,牙生江·那斯尔,赛里克·都曼,

钱勇,曹少先,王伟列,孟春花,张俊,张建丽(572)

关岭牛 MEF2A 基因干扰载体构建及其转染对成肌细胞的影响

孙金魁,许厚强,石鹏飞,阮涌(584)

蒙古马全身主要骨骼肌表型谱的构建及比较研究

贾紫洁,图格琴,丁文淇,任秀娟,刘慧莹,李欣泽,翠芳,芒来,白东义(596)

基于 GBLUP 等模型对梅花鹿 (*Cervus Nippon*) 生长相关性状基因组选择的预测准确性比较

李浩东,闵祥玉,周雅,张禾咩,郑军军,刘琳玲,王平,王艳梅,杨福合,王桂武(608)

营养与饲料

卷帘舍环境参数与奶牛泌乳性能及行为的相关性分析

刘爱瑜,冯曼,李永亮,赵心念,郭建军,王亚男,高玉红(617)

饲粮中添加芦丁对肉鸡回肠形态、免疫、抗氧化及屏障功能的影响

刘慧娟,王超,周斌斌,张佳琦,王恬,庄苏(630)

断尾对兰州大尾羊生长性能、脂肪沉积分布和屠宰性能的影响
..... 宋淑珍,刘俊斌,朱才业,徐红伟,刘立山,孔艳龙(642)

预防兽医

- 表达鸡传染性法氏囊病病毒 VP2 基因的重组火鸡疱疹病毒的构建及生物学特性分析
..... 李晓涵,杨伏春,刘 芮,高 立,崔红玉,张艳萍,刘长军,祁小乐,
王笑梅,高玉龙,李 凯(656)
- gga-miR-155 对 MDCC-MSB1 细胞转录组的影响
..... 余祖华,贾艳艳,何 雷,廖成水,李 静,魏 颖,陈 建,陈松彪,尚 珂,丁 辉(663)
- 吉林省肉牛冠状病毒感染状况调查及分析..... 孙飞雁,叶京飞,魏 宇,王子贤,张金玉,
邴丽媛,孟婷婷,王 帅,赵立峰,孙 亮,郭 利(673)
- 热休克蛋白 HSP90B1 影响牛病毒性腹泻病毒复制的研究
..... 陈俊贞,权 冉,付 强,葛丽娟,袁圆圆,张成远,李建林,史慧君(683)
- 白细胞介素-10 对口蹄疫病毒感染小鼠 T 细胞增殖及其表达 TNF- α 、IFN- γ 和 IL-2 的影响
..... 郭紫晶,陈 飞,张志雄,柏 玲,张志东,李彦敏(694)
- 条件性敲除 D1133L 基因的重组非洲猪瘟病毒的构建及增殖特性
..... 张 婷,冯 涛,杨金柯,郝 雨,杨 行,张大俊,史喜绢,闫文倩,
陈玲玲,刘湘涛,郑海学,张克山(706)
- 猪瘟病毒非结构蛋白 NS5A 与 Beclin1 相互作用并促进病毒增殖
..... 张成成,孙嘉豪,王秀玲,张小荣,吴艳涛(715)
- 牛源坏死梭杆菌 43K 外膜蛋白的黏附特性研究
..... 贺显晶,刘 娇,王志慧,武 瑞,郭东华(726)
- IFN- α 对山羊副流感病毒 3 型的抗病毒活性
..... 孙 敏,郝 飞,张纹纹,李文良,杨蕾蕾,毛 立,程子龙,刘茂军(736)

基础兽医

- 壳寡糖对仔猪脑海马氧化应激的抑制作用及机制研究 杨成迎,汪 错,黄子晴,林海烂,
王乃秀,李雨航,刘炎青,刘煜萱,朱 燕,何道领,陈红跃,甘 玲(744)
- 低浓度阿奇霉素对猪链球菌 2 型蛋白表达、荚膜多糖与药物敏感性的影响
..... 杨艳北,许 晶,刘婉萍,陶艾妮,冯育林,孙 勇,王 阖,刘 建(757)
- 基于免疫磁珠净化间接竞争酶联免疫吸附试验检测氟喹诺酮类药物
..... 黄婧洁,李 苗,陈莹娴,钟雅兰,张婷婷,姜廷超男,李建成(766)
- 右美托咪定抑制 NOX4 缓解急性应激致大鼠肾损伤
..... 杨昊天,陈永平,王志强,黄宇翔,马志刚,邹 跃,魏念冬,张 红,李 鑫,董佳强,吕明哲,
李洪彬,刘力威,杨昊轩,张国华,刘雪松,钟 鹏,石荷叶,寇玉红,陈志峰(779)
- 铁死亡参与镉暴露鸡肝损伤的研究
..... 陈敬宜,于 森,张金洋,樊 塑,杨桂君,葛 铭,张瑞莉(787)

临床兽医

- 电针疗法对 AKI 犬的肾脏功能、钙磷代谢、抗氧化能力以及 NRF2 信号通路的影响
..... 张嘉宾,徐 钊,周光余,张梦迪,符 杨,刘佳琪,周东海(803)
- 基于 CT 技术评估髌骨内脱位骨骼畸形 乔康佳,袁占奎,王佳尧,石 磊,王 媚,张 彬(816)
- 仔鼠哺乳期补充参苓白术散改善抗生素诱导的肠道稳态失衡
..... 张文娟,王志华,练家乐,屈 倩,吕伟杰,陈淑爱,郭世宁(825)
- 白果内酯对 IL-1 β 诱导的 ATDC5 软骨细胞自噬、增殖和凋亡的影响
..... 马天文,于 跃,吕良钰,贾丽娜,阮红日,王颢然,王新宇,张雨欣,张建涛,高 利(837)

研究简报

- 猪流行性腹泻病毒 TaqMan 检测方法的建立及基于 S 基因的遗传变异分析
..... 翟 刚,顾文源,刘 涛,刘 莹,张 帅,范京惠,左玉柱(847)

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. 54 No. 2(Feb. 2023)

CONTENTS

REVIEW

- Single-Cell Transcriptome Sequencing Technology and its Application in Animal Reproduction LIU Yuanyi, LI Xinyu, Bayinnamula, CUI Fang, MANG Lai, DU Ming(421)
Advances of Disease-Resistant Breeding on Porcine Reproductive and Respiratory Syndrome LIU Ling, WANG Dandan, CUI Kai, MA Yuehui, JIANG Lin(434)
Research Progress of the DNA Methylation in Mammalian Oocyte and Early Embryo Development YANG Xiaogeng, ZHANG Huizhu, LI Jian, XIANG Hua, HE Honghong(443)
Advances in Cryopreservation of Bovine Embryo *in vitro* FENG Xiaoyi, XU Xi, ZHANG Hang, YANG Baigao, ZHANG Peipei, HAO Haisheng, DU Weihua, ZHU Huabin, CUI Kai, ZHAO Xueming(451)
MicroRNAs Regulate Antiviral Immunity and Viral Replication WANG Lan, HE Mingyu, ZHANG Min, DING Juntao(463)
Advances in the Roles of Curcumin on Regulating Gut Microbiota and Antiviral Effects ZHUO Ruhao, LIU Qingyang, ZHONG Xiang(473)
Research Progress on Abnormal Glucose and Lipid Metabolism in Dairy Cows Induced by Lipopolysaccharide (LPS) FAN Lei, SHEN Yu, YOU Liuchao, TIAN Xinyu, LUO Hao, WANG Xin, ZHANG Tingting, SHEN LiuHong(484)
Activation Mechanism of NLRP1 Inflammasome HE Haojie, XUE Mei, FENG Li(494)
Mobile Colistin Resistance Gene (*mcr*): a Severe Challenge to the “Last-line Defense” of Gram-Negative Bacterial Infections HU Jun, DING Shuaishuai, WEI Shuyong(504)

ANIMAL GENETICS AND BREEDING

- Key Genes and Regulatory Network Analysis of Lipid Metabolism Differences between Back Fat and Abdominal Fat of Large Diquing Tibetan Pigs at Different Growth Stages WANG Lin, MA Li, ZHANG Bo, DENG Jun, ZHANG Hao, OUYANG Xiaofang, YAN Dawei, DONG Xinxing(520)
Genome-wide Association Study Reveals the Genetic Basis of Hatching Traits in White-feathered Broilers ZHANG Gaomeng, DING Jiqiang, LIU Yuhong, ZHENG Maiqing, WEN Jie, ZHAO Guiping, LI Qinghe(534)
Expression of METTL16 in Different Types of Chicken Muscle and Its Regulatory Role in Chicken Skeletal Muscle Function PANG Lichuan, SHAN Yanju, LIU Yifan, ZHANG Ming, GAN Dafeng, TU Yunjie, JI Gaige, JU Xiaojun, SHU Jingting, ZOU Jianmin(545)
Genetic Diversity and Population Structure Analysis of Chinese Native Chicken Breeds using Genome-wide SNPs GAO Chaoqun, CAO Ranran, DU Wenping, HU Xiaoyu, LEI Yanru, LI Wenting, KANG Xiangtao(554)
Identification and Characterization of Brown Adipose Tissue in Sonid Lambs FANG Qinyuan, FU Shaoyin, WANG Biao, HE Xiaolong, HE Jiangfeng, WANG Liwei, CHEN Xin, ZHANG Lin, WANG Daqing, ZHANG Liling, LIU Yongbin(563)
Evaluation of Genetic Diversity and Genetic Structure in Kirgiz Sheep Population Based on SNPs Chip LI Yinxia, YA Shengjiang • Nasier, SAI Like • Duman, QIAN Yong, CAO Shaoxian, WANG Weilie, MENG Chunhua, ZHANG Jun, ZHANG Jianli(572)
Construction of MEF2A Gene Interference Vector and Effect of Its Transfection on Myoblasts in Guanling Cattle SUN Jinkui, XU Houqiang, SHI Pengfei, RUAN Yong(584)
Construction and Comparative Study of the Phenotypic Spectrum of the Main Skeletal Muscles Throughout the Mongolian Horse JIA Zijie, BAO Tugeqin, DING Wenqi, REN Xiujuan, LIU Huiying, LI Xinze, CUI Fang, DUGARJAVIIN Manglai, BAI Dongyi(596)
Comparison of Prediction Accuracy of Genomic Selection for Growth-related Traits in Sika Deer (*Cervus Nippon*) based on GBLUP and other Models LI Haodong, MIN Xiangyu, ZHOU Ya, ZHANG Heyang, ZHENG Junjun, LIU Linling, WANG Ping, WANG Yanmei, YANG Fuhe, WANG Guiwu(608)

ANIMAL NUTRITION AND FEEDS

- Correlation Analysis between Environmental Parameters of Rolling Shed and Lactation Performance and Behavior of Dairy Cow LIU Aiyu, FENG Man, LI Yongliang, ZHAO Xinnian, GUO Jianjun, WANG Yanan, GAO Yuhong(617)

- Effects of Dietary Rutin Supplementation on Ileal Morphology, Immunity, Antioxidant and Barrier Function of Broilers LIU Huijuan, WANG Chao, ZHOU Binbin, ZHANG Jiaqi, WANG Tian, ZHUANG Su(630)
The Effect of Tail Docking on Growth Performance, Fat Deposition Distribution and Slaughter Performance in Lanzhou Fat-tailed Sheep SONG Shuzhen, LIU Junbin, ZHU Caiye, XU Hongwei, LIU Lishan, KONG Yanlong(642)

PREVENTIVE VETERINARY MEDICINE

- Construction of Recombinant Herpesvirus of Turkey Expressing Infectious Bursal Disease Virus VP2 Gene and Analysis of Its Biological Characteristics LI Xiaohan, YANG Fuchun, LIU Rui, GAO Li, CUI Hongyu, ZHANG Yanping, LIU Changjun, QI Xiaole, WANG Xiaomei, GAO Yulong, LI Kai(656)
Effects of gga-miR-155 on MDCC-MSB1 Cell Transcriptomes YU Zuhua, JIA Yanyan, HE Lei, LIAO Chengshui, LI Jing, WEI Ying, CHEN Jian, CHEN Songbiao, SHANG Ke, DING Ke(663)
Epidemiological Investigation and Analysis of Bovine Coronavirus in Beef Cattle in Jilin Province SUN Feiyan, YE Jingfei, WEI Yu, WANG Zixian, ZHANG Jinyu, BING Liyuan, MENG Tingting, WANG Shuai, ZHAO Lifeng, SUN Liang, GUO Li(673)
Study on the Effect of Heat Shock Protein HSP90B1 on the Replication of Bovine Viral Diarrhea Virus CHEN Junzhen, QUAN Ran, FU Qiang, GE Lijuan, YUAN Yuanyuan, ZHANG Chengyuan, LI Jianlin, SHI Huijun(683)
Effects of Interleukin-10 on T Cell Proliferation and Its Expression of TNF- α , IFN- γ and IL-2 in Mice Infected with Foot-and-Mouth Disease Virus GUO Zijing, CHEN Fei, ZHANG Zhixiong, BAI Ling, ZHANG Zhidong, LI Yanmin(694)
Construction and Growth Characteristics of Recombinant African Swine Fever Virus with Conditional Deletion of D1133L Gene ZHANG Ting, FENG Tao, YANG Jinke, HAO Yu, YANG Xing, ZHANG Dajun, SHI Xijuan, YAN Wenqian, CHEN Lingling, LIU Xiangtao, ZHENG Haixue, ZHANG Keshan(706)
Beclin1 Interacts with the Nonstructural Protein NS5A of CSFV and Promotes Virus Proliferation ZHANG Chengcheng, SUN Jiahao, WANG Xiuling, ZHANG Xiaorong, WU Yantao(715)
Adhesion Characterization of 43K OMP in *Fusobacterium necrophorum* subsp. *necrophorum* HE Xianjing, LIU Jiao, WANG Zhihui, WU Rui, GUO Donghua(726)
The Antiviral Activity of Goat Interferon Alpha to Caprine Parainfluenza Virus 3 SUN Min, HAO Fei, ZHANG Wenwen, LI Wenliang, YANG Leilei, MAO Li, CHENG Zilong, LIU Maojun(736)

BASIC VETERINARY MEDICINE

- Study on the Inhibitory Effect of Chito-oligosaccharide on Oxidative Stress in Hippocampus of Piglets and Its Mechanism YANG Chengying, WANG Kai, HUANG Ziqing, LIN Hailan, WANG Naixiu, LI Yuhang, LIU Yanqing, LIU Yuxuan, ZHU Yan, HE Daoling, CHEN Hongyue, GAN Ling(744)
Effects of Low-concentration Azitromycin on Protein Expression, Capsular Polysaccharides and Drug Susceptibility of *Streptococcus suis* Type 2 YANG Yanbei, XU Jing, LIU Wanping, TAO Aini, FENG Yulin, SUN Yong, WANG Chuang, LIU Jian(757)
Indirect Competitive Enzyme-Linked Immunosorbent Assay for the Detection of Fluorquinolones based on Immunomagnetic Bead Purification HUANG Jingjie, LI Miao, CHEN Yingxian, ZHONG Yalan, ZHANG Tingting, JIANG Tingchaonan, LI Jiancheng(766)
Dexmedetomidine Inhibits NOX4 and Alleviates Acute Stress-induced Renal Injury in Rats YANG Haotian, CHEN Yongping, WANG Zhiqiang, HUANG Yuxiang, MA Zhigang, ZOU Yue, WEI Niandong, ZHANG Hong, LI Xin, DONG Jiaqiang, LÜ Mingzhe, LI Hongbin, LIU Liwei, YANG Haoxuan, ZHANG Guohua, LIU Xuesong, ZHONG Peng, SHI Heye, KOU Yuhong, CHEN Zhifeng(779)
Study on the Involvement of Ferroptosis in Liver Injury of Cadmium-exposed Chickens CHEN Jingyi, YU Miao, ZHANG Jinyang, FAN Kun, YANG Guijun, GE Ming, ZHANG Ruili(787)

CLINICAL VETERINARY MEDICINE

- Effects of Electroacupuncture Therapy on Renal Function, Calcium and Phosphorus Metabolism, Antioxidant Capacity and NRF2 Signaling Pathway in AKI Dogs ZHANG Jiabin, XU Zhao, ZHOU Guangyu, ZHANG Mengdi, FU Yang, LIU Jiaqi, ZHOU Donghai(803)
Evaluation of Skeletal Deformities in Dogs with Medial Patellar Luxation Based on CT QIAO Kangjia, YUAN Zhankui, WANG Jiayao, SHI Lei, WANG Xiao, ZHANG Bin(816)
Supplement of Shenling Baizhu Powder to Offspring Rats during Suckling Improved Intestinal Dyshomeostasis Induced by Antibiotics ZHANG Wenchang, WANG Zhihua, LIAN Jiale, QU Qian, LÜ Weijie, CHEN Shuai, GUO Shining(825)
Effects of Bilobalide on Autophagy, Proliferation and Apoptosis of IL-1 β -induced ATDC5 Chondrocytes MA Tianwen, YU Yue, LÜ Liangyu, JIA Lina, RUAN Hongri, WANG Haoran, WANG Xinyu, ZHANG Yuxin, ZHANG Jiantao, GAO Li(837)

RESEARCH NOTES

- Establishment of TaqMan Detection Method of Porcine Epidemic Diarrhea Virus and Analysis of Genetic Variation based on S Gene ZHAI Gang, GU Wenyuan, LIU Tao, LIU Ying, ZHANG Shuai, FAN Jinghui, ZUO Yuzhu(847)

《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 房于明 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 张沅 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 郭云雁

畜牧兽医学报

(月刊,1956年创刊)

2023年 第54卷 第2期

2023年2月23日出版

主管 中国科学技术协会
主办 中国畜牧兽医学会
编辑 《畜牧兽医学报》编委会
中国农业科学院北京畜牧兽医研究所
地址 北京海淀区圆明园西路2号
邮编 100193
电话 010-62815987 62816996 62893836
网址 <http://www.xmsyxb.com>
电子邮箱 xmsyxb@caas.cn
出版单位 《中国畜牧兽医杂志》有限公司
印刷 北京科信印刷有限公司
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

ACTA VETERINARIA ET ZOO TECHNICA SINICA

(Monthly, Started in 1956)

Vol. 54 No. 2 2023

Published on Feb. 23, 2023

Supervised by China Association for Science and Technology
Sponsored by Chinese Association of Animal Science and Veterinary Medicine
Edited by Editorial Board of the ACTA VETERINARIA ET ZOO TECHNICA SINICA
Institute of Animal Science,Chinese Academy of Agricultural Sciences
Address No.2 West Road Yuanmingyuan, Haidian Beijing, China. Post Code 100193
Telephone 010-62815987 62816996 62893836
Website <http://www.xmsyxb.com>
E-mail xmsyxb@caas.cn
Published by Chinese Journal of Animal Science and Veterinary Medicine Co.,Ltd
Printed by Beijing Kexin Printing Co.,Ltd
Distributed by Domestic Beijing Post Office, China Post Group Corporation
Overseas China International Book Trading Corporation,P.O.Box 399