



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.9

## 2022

中国畜牧兽医学会

CHINESE ASSOCIATION OF ANIMAL  
SCIENCE AND VETERINARY MEDICINE

ISSN 0366-6964



# 畜牧兽医学报

XUMU SHOUYI XUEBAO

第 53 卷 第 9 期 2022 年 9 月

## 目 次

### 综 述

- 基于文献计量的“十三五”国家重点研发计划“畜禽专项”研究进展与热点趋势分析  
..... 孙康泰,刘 彬,刘 军,蒋大伟,姚志鹏,葛毅强,邓小明(2819)
- 猪基因组结构变异研究进展 ..... 宗文成,王立刚,宋成义,王立贤,张龙超(2833)
- 微生物-肠-肌轴调节骨骼肌代谢和功能的研究进展 ..... 周 敏,汪凯歌,张 濂,马 曦(2845)
- 环境温度对动物肠道微生物菌群影响的研究进展  
..... 郭新羽,沙玉柱,蒲小宁,吕卫兵,刘 秀,胡 江,罗玉柱,王继卿,李少斌,赵志东(2858)
- 甲型疱疹病毒亚科的疱疹病毒囊膜糖蛋白 gC 对病毒感染复制的影响  
..... 丰 鑫,汪铭书,程安春(2867)

### 遗传育种

- 中国瘦肉型猪育种目标性状经济权重的测算 ..... 吴俊超,王立刚,王立贤(2877)
- 产蛋前期和产蛋高峰期鸡全基因组甲基化差异及其对肝脏转录组影响的研究  
..... 郭玉龙,职毅豪,李欣妍,董佳佳,李转见,田亚东,李 红,刘小军(2888)
- 鸡微粒体甘油三酯转运蛋白样基因生物学特性及表达调控 ..... 徐春林,曹玉珠,夏 天,贾其辉,  
王丹丹,郑 航,田亚东,康相涛,蒋瑞瑞,刘小军,李 红(2900)
- 基于 SNP 标记的滩羊亲子鉴定研究  
..... 李 玲,李业芳,梁奔梦,孙玉江,马月辉,马 青,蒋 琳,刘书琴(2912)
- 绵羊 *FecB* 突变检测方法的建立及高繁滩羊核心群的构建  
..... 周世卫,吴庭杰,王 倩,蔡 蓓,韩赛铮,吴彦虎,王小龙,陈玉林(2920)
- 基于 WGCNA 与 GSEA 方法挖掘调控中卫山羊毛弯曲相关基因  
..... 李晓波,刘占发,刘 悦,陈 倩,马月辉,赵倩君,叶绍辉(2930)
- 中国荷斯坦牛繁殖性状的基因组预测效果比较 ..... 师 睿,苏国生,陈紫薇,李 想,罗汉鹏,刘 林,  
郭 刚,张 毅,王雅春,张胜利,张 勤(2944)
- 荷斯坦牛泌乳前期体况评分及其对泌乳性能和离群寿命的影响  
..... 周福振,周 部,代 旭,王海洋,郭梦玲,梁 艳,杨章平,毛永江(2955)
- 奶牛 *SP1* 基因结构及对乳脂合成功能的初步分析  
..... 杨 洋,周子薇,张京一,杨 硕,王博宇,葛 楠,林 叶,侯晓明(2970)

### 生物技术与繁殖

- 氯化钴通过诱发 DNA 氧化损伤抑制猪卵泡颗粒细胞增殖的研究  
..... 魏甲园,郝 倩,杨亚星,申 明(2982)
- 双氢睾酮通过调控孕酮、雌二醇和细胞凋亡参与绵羊子宫功能  
..... 丁自强,葛闻博,段宏伟,吕建树,曾建林,王文娟,牛 甜,张 勇,赵兴绪,胡俊杰(2993)
- 原花青素对玉米赤霉烯酮诱导牦牛颗粒细胞氧化损伤的保护作用研究  
..... 唐紫雯,程华琴,刘冬菊,彭毛卓玛,杨 雪,李 键,殷 实(3006)

### 营养与饲料

- 泌乳早期奶牛瘤胃微生物与牛奶脂肪酸组成的变化  
..... 胡立萍,沈子亮,王 全,于紫桐,张琦琦,毛永江,杨章平,张慧敏(3018)

- 沙葱及其提取物对舍饲肉羊肾周脂肪膈味物质代谢组特征的影响 … 刘旺景,唐德富,敖长金(3029)
- 日粮能量水平对湖羊瘤胃发酵特性和微生物组成的影响  
 …… 韦 肖,张建童,龙唐晖,李开嵘,李艳娇,欧阳克蕙,邱清华(3042)
- H<sub>2</sub>S 暴露对保育猪氧化还原状态及硫化氢代谢的影响  
 …… 陈 磊,刘 真,谢彦娇,苗启翔,骆城增,张宏福,唐湘方(3052)
- 藏猪对饲料纤维的消化及其与肠道微生物的相关性研究  
 …… 谭占坤,商振达,褚瑰燕,蔡传江,朱彦宾,邓 文,强巴央宗,刘锁珠(3063)
- 日粮添加酵母硒对鸡肉线粒体氧化损伤及细胞凋亡的影响  
 …… 杨 雪,杨 超,王 拙,唐德富,张 丽,余群力(3079)

## 预防兽医

- 我国 H5 和 H7N9 亚型高致病性禽流感的监测及疫情暴发分析  
 …… 周 勇,李知新,鲁宏伟,孙 燕,李 甜,杜凡姝,蒲 娟(3093)
- 1 株 E 亚群禽白血病病毒的分离鉴定及遗传进化分析 …… 王 萌,张森豪,张 柳,李佳璇,  
 王晓娜,崔 文,姜艳平,周 晗,王 丽,乔薪媛,李一经,唐丽杰(3107)
- 猫细小病毒的遗传演化及分离毒株的致病性分析  
 …… 程宝钰,李子荷,崔燕蕾,李嘉慧,杨鑫玮,于永乐,杨海燕,单 虎,张传美(3121)
- 牛传染性鼻气管炎病毒诱导 MDBK 细胞线粒体损伤模型的建立  
 …… 郭雪萍,马英才,李泽龙,王添姿,高函雅,徐李依娜,吴煜锋,钟 旗,姚 刚,马雪连(3132)
- 山羊源 3 种不同形态阴门盖捻转血矛线虫雌虫的多位点序列分析  
 …… 梁高星,荣诗琪,王俊伟,李 媛,杨 新,赵光辉,宋军科(3140)

## 基础兽医

- LncRNA NR\_003508 通过海绵吸附 miR-483-3p 并靶向 MLKL 调控 BCG 感染小鼠巨噬细胞坏死  
 …… 于志瑞,张 旭,牛莎莎,邓光存,吴晓玲(3149)
- 粪肠球菌感染小鼠的脑组织病理学观察及转录组学差异分析  
 …… 曹梦园,陈明杰,王晨豫,李益涛,闫雪琪,陈 杰,齐亚银(3160)
- 唾液乳杆菌对鸡毒支原体感染肉鸡生长性能及肺损伤的影响 …… 王 剑,陈雪苹,李继昌(3172)
- 抗菌肽 Tachyplesin I 及衍生物对大肠杆菌细胞膜作用机制的对比研究  
 …… 孙 栋,屈 莎,李 璇,唐善虎,李思宁,郝 刚(3180)
- 苯基吡啶酮衍生物影响猪  $\delta$  冠状病毒复制的作用分析  
 …… 姚 晨,郭 萌,胡 慧,史晨曦,杨国宇(3190)
- 基于 PK/PD 模型对恩诺沙星可溶性粉在鸡混饮给药方案的药效再评价  
 …… 高嫣璐,王美红,聂 雅,王 震,卜仕金(3199)
- 盐酸小檗碱与左氧氟沙星联合抑制 MRSA 及其机制研究  
 …… 操庆国,郭 钦,彭 凯,蔡佳惠,任成万,李昀庭(3208)
- 丁酸钠通过 AMPK 通路调控 LPS 造成牛乳腺上皮细胞脂代谢紊乱的作用机制  
 …… 李 林,曹 萌,宫彬彬,赵 梅,王 婕,张晓辉(3221)

## 临床兽医

- 硒对树突状细胞和巨噬细胞功能的调控作用  
 …… 景丽荣,张 超,乔 杰,海尼斯格,杨 英,高珍珍(3231)
- NAC 通过抑制大鼠肺细胞凋亡缓解辐致肺组织损伤  
 …… 仝锡帅,余耿生,李雅文,冉 迪,顾建红,邹 辉,袁 燕,卞建春,刘宗平(3241)
- 黄芪多糖降低脂多糖对鸡巨噬细胞促炎细胞因子和 TLRs mRNA 转录水平影响的效应分析  
 …… 刘 倩,李大鹏,张 宏,刘 琴,王学智,李建喜,杨孝朴,张景艳(3251)

## 研究简报

- 北京黑猪肌内脂肪含量高、低组间脂质组差异分析 … 张 润,刘 海,杨 曼,张龙超,王 源(3262)
- 非洲猪瘟病毒 MGF360-14L 靶向 MAVS 抑制 I 型干扰素的产生  
 …… 王 洋,崔 帅,鑫 婷,王西西,于海男,陈世钰,蒋亚君,高新桃,  
 庞忠宝,姜一瞳,郭晓宇,贾 红,朱鸿飞(3272)



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. 9 (Sept. 2022)

CONTENTS

REVIEW

Research Progress and Trend Analysis Based on Bibliometric of The National Key Research and Development Program “Animal Project” during the 13th Five-Year Period ..... SUN Kangtai, LIU Bin, LIU Jun, JIANG Dawei, YAO Zhipeng, GE Yiqiang, DENG Xiaoming(2819)

Advances of Structural Variation in Pig Genome ..... ZONG Wencheng, WANG Ligang, SONG Chengyi, WANG Lixian, ZHANG Longchao(2833)

Advances in Microbiota-Gut-Muscle Axis Regulating Skeletal Muscle Metabolism and Function ..... ZHOU Min, WANG Kaige, ZHANG Lian, MA Xi(2845)

Research Progress on the Effect of Ambient Temperature on Intestinal Microflora of Animals ..... GUO Xinyu, SHA Yuzhu, PU Xiaoning, LÜ Weibing, LIU Xiu, HU Jiang, LUO Yuzhu, WANG Jiqing, LI Shaobin, ZHAO Zhidong(2858)

The Role of Alpha Herpesvirus Envelope Glycoprotein C on Virus Infection and Replication ..... FENG Xin, WANG Mingshu, CHENG Anchun (2867)

ANIMAL GENETICS AND BREEDING

Estimation of Economic Weight of Objective Traits for Lean Pigs in China ..... WU Junchao, WANG Ligang, WANG Lixian(2877)

Study on Genome-wide Methylation Difference and Its Effect on Liver Transcriptome in Chickens During Pre-laying and Peak-laying Periods ..... GUO Yulong, ZHI Yihao, LI Xinyan, DONG Jijia, LI Zhuanjian, TIAN Yadong, LI Hong, LIU Xiaojun(2888)

Biological Characteristics and Expression Regulation of Chicken Microsomal Triglyceride Transfer Protein Like Gene ..... XU Chunlin, CAO Yuzhu, XIA Tian, JIA Qihui, WANG Dandan, ZHENG Hang, TIAN Yadong, KANG Xiangtao, JIANG Ruirui, LIU Xiaojun, LI Hong(2900)

Paternity Identification of Tan Sheep Based on SNP Markers ..... LI Ling, LI Yefang, LIANG Benmeng, SUN Yujiang, MA Yuehui, MA Qing, JIANG Lin, LIU Shuqin(2912)

Establishment of the Efficient Method to Detect the *FecB* Mutation and the Construction of the Prolific Tan Sheep Population ..... ZHOU Shiwei, WU Tingjie, WANG Qian, CAI Bei, HAN Saizheng, WU Yanhu, WANG Xiaolong, CHEN Yulin(2920)

Mining Genes Related to Wool Bending of Zhongwei Goat Based on WGCNA and GSEA ..... LI Xiaobo, LIU Zhanfa, LIU Yue, CHEN Qian, MA Yuehui, ZHAO Qianjun, YE Shaohui(2930)

Comparisons of Genomic Predictions for Fertility Traits in Chinese Holstein Cattle ..... SHI Rui, SU Guosheng, CHEN Ziwei, LI Xiang, LUO Hanpeng, LIU Lin, GUO Gang, ZHANG Yi, WANG Yachun, ZHANG Shengli, ZHANG Qin(2944)

Analysis on the Change of BCS in Early Lactation and Its Effects on Production Performance and Productive Lifespan in Holstein Cows ..... ZHOU Fuzhen, ZHOU Bu, DAI Xu, WANG Haiyang, GUO Mengling, LIANG Yan, YANG Zhangping, MAO Yongjiang(2955)

Analysis on SP1 Gene Structure and Its Function on Milk Fat Synthesis in Holstein Dairy Cows ..... YANG Yang, ZHOU Ziwei, ZHANG Jingyi, YANG Shuo, WANG Boyu, GE Nan, LIN Ye, HOU Xiaoming(2970)

ANIMAL BIOTECHNOLOGY AND REPRODUCTION

Inhibition of Porcine Follicular Granulosa Cell Proliferation by Cobalt Chloride Induced DNA Oxidative Damage ..... WEI Jiayuan, ZHU Qian, YANG Yaxing, SHEN Ming(2982)

Dihydrotestosterone Affects Sheep Uterine Function through Regulating Progesterone, Oestrogen and Apoptosis ..... DING Ziqiang, GE Wenbo, DUAN Hongwei, LÜ Jianshu, ZENG Jianlin, WANG Wenjuan, NIU Tian, ZHANG Yong, ZHAO Xingxu, HU Junjie(2993)

The Protective Effect of Proanthocyanidins on Oxidative Damage of Yak Granulosa Cells Induced by Zearalenone ..... TANG Ziwen, CHENG Huaqin, LIU Dongju, PHAGMO Droma, YANG Xue, LI Jian, YIN Shi(3006)

ANIMAL NUTRITION AND FEEDS

Changes of Rumen Microbe and Milk Fatty Acid Composition during Early Lactation ..... HU Liping, SHEN Ziliang, WANG Quan, YU Zitong, ZHANG Qiqi, MAO Yongjiang, YANG Zhangping, ZHANG Huimin(3018)

Effect of *Allium mongolicum* Regel and Its Extract on the Metabolomic Characteristics of Perirenal Adipose Tissue Typical Odor and Flavor Substances in Captive Meat Sheep ..... LIU Wangjing, TANG Defu, AO Changjin(3029)

Effects of Dietary Energy Level on Rumen Fermentation Characteristics and Microbial Composition of Hu Sheep ..... WEI Xiao, ZHANG Jiantong, LONG Tanghui, LI Kairong, LI Yanjiao, OUYANG Kehui, QIU Qinghua(3042)

Effects of H<sub>2</sub>S Exposure on Redox Status and Hydrogen Sulfide Metabolism in Nursery Pigs ..... CHEN Lei, LIU Zhen, XIE Yanjiao, MIAO Qixiang, LUO Chengzeng, ZHANG Hongfu, TANG Xiangfang(3052)

Study on Dietary Fibre Digestion and Its Correlation with Intestinal Microbiome of Tibetan Pigs ..... TAN Zhankun, SHANG Zhenda, CHU Guiyan, CAI Chuanjiang, ZHU Yanbin, DENG Wen, QIANGBA Yangzong, LIU Suozhu(3063)

Effect of Dietary Supplementation of Yeast Selenium on Mitochondrial Oxidative Damage and Apoptosis of Chicken ..... YANG Xue, YANG Chao, WANG Zhuo, TANG Defu, ZHANG Li, YU Qunli(3079)

**PREVENTIVE VETERINARY MEDICINE**

Surveillance and Outbreak Analysis of H5 and H7N9 Subtypes of Highly Pathogenic Avian Influenza in China ..... ZHOU Yong, LI Zhixin, LU Hongwei, SUN Yan, LI Tian, DU Fanshu, PU Juan(3093)

Isolation, Identification and Genetic Evolution Analysis of a Subgroup E Avian Leukemia Virus ..... WANG Meng, ZHANG Senhao, ZHANG Liu, LI Jiaxuan, WANG Xiaona, CUI Wen, JIANG Yanping, ZHOU Han, WANG Li, QIAO Xinyuan, LI Yijing, TANG Lijie(3107)

Genetic Evolution of Feline Parvovirus and Pathogenicity of an Isolated Strains ..... CHENG Baoyu, LI Zihe, CUI Yanlei, LI Jiahui, YANG Xinwei, YU Yongle, YANG Haiyan, SHAN Hu, ZHANG Chuanmei(3121)

Establishment of a Model of Mitochondrial Damage Induced by Bovine Infectious Rhinotracheitis Virus in MDBK Cells ..... GUO Xueping, MA Yingcai, LI Zelong, WANG Tianzi, GAO Hanya, XU-Li Yina, WU Yufeng, ZHONG Qi, YAO Gang, MA Xuelian(3132)

Multi-locus Gene Sequence Analysis of Female *Haemonchus contortus* with Morphological Differences in Vulval Flap from Goat ..... LIANG Gaoxing, RONG Shiqi, WANG Junwei, LI Yuan, YANG Xin, ZHAO Guanghui, SONG Junke(3140)

**BASIC VETERINARY MEDICINE**

LncRNA NR\_003508 Regulates BCG-infected Mouse Macrophages Necrosis by the Sponge Adsorption of miR-483-3p and Targeting MLKL ..... YU Zhirui, ZHANG Xu, NIU Shasha, DENG Guangcun, WU Xiaoling(3149)

Pathological Observation and Transcriptomic Difference Analysis from Mice Infected with *Enterococcus faecalis* ..... CAO Mengyuan, CHEN Mingjie, WANG Chenyu, LI Yitao, YAN Xueqi, CHEN Jie, QI Yayin(3160)

Effects of *Lactobacillus salivary* on Growth Performance and Lung Injury of Broilers Challenged with *Mycoplasma gallisepticum* ..... WANG Jian, CHEN Xueping, LI Jichang(3172)

Comparative Study on the Membrane Action Mechanism of Tachyplesin I and Its Analogue on *Escherichia coli* ..... SUN Dong, QU Sha, LI Xuan, TANG Shanhu, LI Sining, HAO Gang(3180)

Effects of Phenylpyridinone Derivative on the Replication of Porcine Deltacoronavirus ..... YAO Chen, GUO Meng, HU Hui, SHI Chenxi, YANG Guoyu(3190)

Reevaluation of the Efficacy of Enrofloxacin Soluble Powder Mixed Drink Administration Regimen in Chicken by Modelling of Pharmacokinetic and Pharmacodynamic Data ..... GAO Yanjun, WANG Meihong, NIE Ya, WANG Zhen, BU Shijin(3199)

The Inhibition and Mechanism of the Combination of Berberine Hydrochloride and Levofloxacin on MRSA ..... CAO Qingguo, GUO Qin, PENG Kai, CAI Jiahui, REN Chengwan, LI Yunting(3208)

The Mechanism of Sodium Butyrate through AMPK Pathway to Regulate Lipid Metabolism Disorder Caused by LPS in Bovine Mammary Epithelial Cells ..... LI Lin, CAO Meng, GONG Binbin, ZHAO Mei, WANG Jie, ZHANG Xiaohui(3221)

**CLINICAL VETERINARY MEDICINE**

Effects of Selenium on the Function of Dendritic Cells and Macrophages ..... JING Lirong, ZHANG Chao, QIAO Jie, HAI Nisige, YANG Ying, GAO Zhenzhen(3231)

NAC Alleviates Cadmium-induced Lung Damage by Inhibiting the Apoptosis of Lung Cell in Rats ..... TONG Xishuai, YU Gengsheng, LI Yawen, RAN Di, GU Jianhong, ZOU Hui, YUAN Yan, BIAN Jianchun, LIU Zongping(3241)

Immunoregulation Effect of Astragalus Polysaccharide on Lipopolysaccharide Injured HD11 Cells and the Effect on TLRs mRNA Expression ..... LIU Qian, LI Dapeng, ZHANG Hong, LIU Qin, WANG Xuezhi, LI Jianxi, YANG Xiaopu, ZHANG Jingyan(3251)

**RESEARCH NOTES**

Analysis of Lipidome Difference between High and Low Intramuscular Fat Content Groups in Beijing Black Pigs ..... ZHANG Run, LIU Hai, YANG Man, ZHANG Longchao, WANG Yuan(3262)

ASFV MGF360-14L Interacts with MAVS and Inhibit the Expression of Type I Interferon ..... WANG Yang, CUI Shuai, XIN Ting, WANG Xixi, YU Hainan, CHEN Shiyu, JIANG Yajun, GAO Xintao, PANG Zhongbao, JIANG Yitong, GUO Xiaoyu, JIA Hong, ZHU Hongfei(3272)

# 《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 闵于明 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 白永平

## 畜牧兽医学报

(月刊,1956年创刊)

2022年 第53卷 第9期

2022年9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  
中国农业部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](mailto: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 ZOOTECHNICA SINICA

(Monthly, Started in 1956)

Vol. 53 No. 9 2022

Published on Sept. 23, 2022

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 ZOOTECHNICA 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](mailto: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

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