



2022年第46期总369期

动物营养专题

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2022年11月14日

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▶ 前沿资讯

1. O-型糖和微生物维持猪肠道稳态的互作机制被揭示

简介: 近日,中国农业科学院北京畜牧兽医研究所家畜营养与调控科技创新团队系统揭示了肠道黏蛋白O-型糖链和微生物维持猪肠道稳态的互作机制。相关研究成果发表在《微生物组(Microbiome)》上。断奶仔猪腹泻是引起仔猪死亡的重要原因,是困扰养猪业的重大难题之一,给生猪产业造成了严重经济损失。已有研究表明,肠上皮细胞和菌群通过相互调节,可以维持肠道内稳态,控制炎症发生,然而腹泻仔猪肠道黏膜屏障变化特征尚未完全清晰。研究人员以断奶仔猪为模型,通过凝集素(UEA)和AB-PAS染色发现,腹泻仔猪结肠黏液层形态受损,厚度显著低于健康仔猪,杯状细胞数量也显著减少。利用猪肠道黏蛋白O-糖基化分析方法,发现腹泻仔猪肠道中O-型糖链长度变短,具有抵御病原菌黏附功能的酸性糖丰度显著降低。体外研究进一步发现,黏蛋白O-型糖作为信号分子能够结合大肠杆菌,保护上皮免受炎症损伤,并可作为共生微生物的能量来源,与微生物形成互利共生关系。该研究揭示了肠道O-型糖链和微生物的互作机制和肠道屏障功能机制,为预防和缓解仔猪腹泻提供了新的基础理论依据。同时,该研究有助于解析人类婴儿腹泻的疾病机制,为开发新的有效疗法提供了参考。

来源: 食品伙伴网

发布日期:2022-11-07

全文链接:

http://agri.ckcest.cn/file1/M00/03/42/Csgk0Ye_HgaAeWoMAAsHfxHDv38270.pdf

2. 国际首例六基因编辑猪

简介: 近日,空军军医大学西京医院宣布,由中国科学院院士、该院窦科峰教授领衔,肝胆外科、泌尿外科、心血管外科等20个学科共同开展的国际首例六基因编辑猪-猴多器官、多组织同期联合移植获得成功,实现了国际异种移植领域多器官多组织移植零的突破。这项移植手术于10月16日实施,历时14个小时结束。研究团队通过获取一头基因编辑猪的肝脏、心脏、肾脏3个脏器,以及角膜、皮肤、骨骼3个组织,分别为4只受体猴同期实施肝肾联合移植、心脏移植、角膜和皮肤移植、骨骼移植。目前,国际上以基因编辑猪为供体的异种组织器官移植研究,多为单一组织或器官移植,而从同一供体猪获取多种不同组织、器官,进行异种多器官多组织同期联合移植的做法,为国际首例。手术的成功进一步拓展和证实了异种移植未来可能的适用范围,为解决供体短缺和器官衰竭患者救治提供了科学数据和技术储备。异种移植是指将一个物种的组织移植到另一个物种体内,其发展历史已有上百年。早在17世纪,西欧就有人尝试用羊的肾脏来挽救尿毒症患者。2022年,美国有了世界首例接受猪心移植的心脏病患者。

来源: 国际畜牧网

发布日期:2022-11-01

全文链接:

http://agri.ckcest.cn/file1/M00/03/42/Csgk0Ye_Gz-AZYh5ABLJNbo4m9o396.pdf

▶ 学术文献

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1 . Maternal pyrimidine nucleoside supplementation regulates fatty acid, amino acid and glucose metabolism of neonatal piglets (母体添加嘧啶核苷调节新生仔猪脂肪酸、氨基酸和葡萄糖代谢)

简介: Pyrimidine nucleosides (PN) are abundant in mammalian milk and mainly involved in glycogen deposition and lipid metabolism. To investigate the effects of maternal supplementation with pyrimidine nucleoside on glucose, fatty acids (FAs), and amino acids (AAs) metabolism in neonatal piglets. Forty pregnant sows were randomly assigned into the control (CON) group (fed a basal diet, n = 20) or the PN group (fed a basal diet supplemented with PN at 150 g/t, n = 20). Litter size, born alive and birth litter weight were recorded. The serum and placenta of sows, and jejunum and liver of neonatal piglets were sampled. The results indicated that supplementing sow diets with PN decreased birth mortality and increased the birth weight of piglets ($P < 0.05$). In addition, neonates from sows supplemented with PN had higher glucose levels in serum and liver compared with the CON group ($P < 0.05$). Moreover, maternal PN supplementation regulated the ratio of saturated FAs and polyunsaturated FAs, and AAs content in serum and liver of piglets ($P < 0.05$). Furthermore, an up-regulation of mRNA expression of genes related to glucose and AA transport were observed in the neonatal jejunum from the PN group ($P < 0.05$). Additionally, hepatic protein expressions of phosphorylated hormone-sensitive lipase (P-HSL), HSL, sterol regulatory element-binding transcription factor 1c (SREBP-1c), and phosphorylated protein kinase B (P-AKT) was higher in the piglets from the PN group than the CON group ($P < 0.05$). Together, maternal PN supplementation may regulate nutrient metabolism of neonatal piglets by modulating the gene expression of glucose and AA transporters in placenta and jejunum, and the gene and protein expression of key enzymes related to lipid metabolism in liver of neonatal piglets, which may improve the reproductive performance of sows.

来源: 中国知网

发布日期:2022-11-03

全文链接:

http://agri.ckcest.cn/file1/M00/03/42/Csgk0Ye_IIaX1UeABOqv8P3uzY928.pdf

2. 酶解金针菇菇脚对断奶仔猪生长性能及肠道功能的影响

简介: 金针菇菇脚因纤维含量过高，直接饲喂会降低仔猪生长性能。其通过酶解处理，营养价值显著提升。本项目旨在研究酶解金针菇菇脚对断奶仔猪生长性能、肠道功能等影响。试验选用108头健康杂交断奶仔猪，试验期28天。随机分为3个处理，对照组饲喂基础饲料，试验组在基础饲料基础上，分别添加2%和4%酶解金针菇菇脚。结果表明，酶解金针菇菇脚可以提高仔猪前期平均日增重 ($P < 0.05$) 及血清中超氧化物歧化酶含量 ($P < 0.05$)，并降低血清中低密度脂蛋白水平 ($P < 0.05$)。还可以提高肠道中短链脂肪酸含量 ($P < 0.05$)，降低回肠腺窝深度 ($P < 0.05$)。综上所述，酶解金针菇菇脚可以在一定程度上，促进仔猪的生长和肠道健康。综合试验结果，推荐仔猪饲料中添加酶解金针菇菇脚量为4%。

来源: 中国知网

发布日期:2022-11-02

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<http://agri.ckcest.cn/file1/M00/10/14/Csgk0GNoa7WAYAMJAAgDYCdeAK8628.pdf>

3 . Multifaceted Effects and Mechanisms of N-Acetylcysteine on Intestinal Injury in a Porcine Epidemic Diarrhea Virus-Infected Porcine Model (N-乙酰半胱氨酸对猪流行性腹泻病毒感染猪模型肠道损伤的多方面影响和机制)

简介: SCOPE: This study investigated the potential effects of N-acetylcysteine (NAC) on intestinal injury in a porcine epidemic diarrhea virus (PEDV)-infected porcine model. **METHODS AND RESULTS:** Thirty-two piglets were randomly assigned to one of four groups: the control, PEDV, NAC, and NAC+PEDV. Piglets in the NAC+PEDV group were orally administrated with NAC (100 mg/kg&middledot;BW/day) for four consecutive days after two days of PEDV infection. The results showed that NAC administration decreased the diarrhea rate and improved intestinal morphology. The concentration of diamine oxidase and intestinal fatty-acid binding protein, as well as IL-1 β , IL-8 and TNF- α in the plasma, was decreased by NAC. Intriguingly, NAC administration significantly increased the viral load in the jejunum and ileum and down-regulated the expression of interferon-related genes. Microarray and proteomic analyses showed that the differentially expressed genes/proteins between NAC+PEDV and PEDV groups were highly enriched in substance transport. Furthermore, aquaporin 8/10 expression was significantly increased by NAC upon PEDV infection. **CONCLUSION:** NAC administration alleviated PEDV-induced intestinal injury by inhibiting inflammatory responses and improving substance transport, but promoted viral replication by inhibiting interferon signaling. These results suggest NAC exhibits multifaceted effects upon PEDV infection, and thus caution is required when using NAC as a dietary supplement to prevent viral infection. This article is protected by copyright. All rights reserved.

来源: 中国知网

发布日期:2022-11-02

全文链接:

http://agri.ckcest.cn/file1/M00/10/14/Csgk0GNobhaAcPrAB088yCIM_E706.pdf