



## 饲料添加L-精氨酸或N-羧甲酰谷氨酸对感染PRRSV妊娠母猪繁殖性能及免疫功能的影响

1. 四川农业大学动物营养研究所, 动物抗病营养教育部重点实验室, 雅安625014;  
2. 中国农业大学国家饲料工程技术研究中心, 北京100193;  
3. 广西商大科技有限公司, 南宁530105

### Effects of Dietary L-arginine or N-carbamylglutamate Supplementation on Reproductive Performance and Immune Function of PRRSV-infected Pregnant Sows

1. Key Laboratory for Animal Disease-resistance Nutrition of China Ministry of Education, Institute of Animal Nutrition, Sichuan Agricultural University, Ya'an 625014, China; 2. National Feed Engineering Technology Research Center, China Agricultural University, Beijing 100193, China; 3. Guangxi Shangda Technology Co. Ltd., Nanning 530105, China

- [摘要](#)
- [参考文献](#)
- [相关文章](#)

Download: PDF (494KB) [HTML](#) (1KB) Export: BibTeX or EndNote (RIS) [Supporting Info](#)

**摘要** 本文旨在研究饲料添加L-精氨酸或N-羧甲酰谷氨酸(N-carbamyl glutamate, NCG)对感染猪繁殖与呼吸综合征病毒(porcine reproductive and respiratory syndrome virus, PRRSV)妊娠母猪繁殖性能及免疫功能的影响。选用3~5胎感染PRRSV的母猪(长白×大约克)60头,随机分为3组,每组20头,单栏饲养。试验猪妊娠第30~90天分别饲喂含1.7% L-丙氨酸(对照组)、1.0% L-精氨酸和0.1% NCG的等氮饲料,妊娠第91天至分娩饲喂对照组饲料。妊娠第30、90和110天早上采食后2 h收集母猪血样。试验结果表明:与对照组相比,1% L-精氨酸添加组窝产活仔数提高0.89头( $P<0.05$ ),窝活仔重提高1.02 kg( $P>0.05$ ),0.1% NCG添加组窝产活仔数提高0.33头( $P>0.05$ );1.0% L-精氨酸添加组和0.1% NCG添加组妊娠第90天母猪血清免疫球蛋白G(IgG)、免疫球蛋白M(IgM)和PRRSV抗体水平显著升高( $P<0.05$ ),血浆尿素浓度显著降低( $P<0.05$ );1.0% L-精氨酸添加组妊娠第90天母猪血浆蛋氨酸、精氨酸、鸟氨酸、脯氨酸浓度显著升高( $P<0.05$ ),妊娠第110天母猪血清IgG水平显著升高( $P<0.05$ );1.0% L-精氨酸添加组和0.1% NCG添加组母猪繁殖性能无显著差异( $P>0.05$ ),但1.0% L-精氨酸添加组妊娠第90天母猪血浆蛋氨酸、精氨酸、鸟氨酸浓度及血清IgG水平显著高于0.1% NCG添加组( $P<0.05$ )。结果提示:饲料添加L-精氨酸或NCG能改善妊娠母猪繁殖性能,其作用途径可能与饲料中L-精氨酸或NCG可以提高母猪体内部分氨基酸利用率及免疫力有关。

**关键词:** L-精氨酸 NCG PRRSV 妊娠母猪 繁殖性能 免疫

**Abstract:** The study was conducted to investigate the effects of dietary L-arginine (Arg) or N-carbamylglutamate (NCG) supplementation on reproductive performance and immune function of porcine productive and respiratory syndrome virus (PRRSV)-infected pregnant sows. At day 30 of gestation, sixty Yorkshire×Landrace multiparous sows with PRRSV infection were selected and randomly assigned into three groups with 20 pigs in each group. Sows in the control group were fed the diet containing 1.7% alanine, and the others in two experimental groups were fed the diets supplemented with 1.0% L-Arg or 0.1% NCG. Sows were fed the control diet from day 91 to 114 of gestation. Blood samples were collected after the morning feed for 2 h at day 30, 90 and 110 of gestation. Compared with the control group, 1.0% L-Arg supplementation increased the number of piglets born alive by 0.89 ( $P<0.05$ ), and live litter birth weight of piglets by 1.02 kg ( $P>0.05$ ); 0.1% NCG supplementation increased the number of piglets born alive by 0.33 ( $P>0.05$ ); serum levels of IgM, IgG and PRRSV-Ab from 1.0% L-Arg or 0.1% NCG supplementation groups were significantly higher than those from the control group at day 90 of gestation ( $P<0.05$ ), and plasma concentration of urea was significantly lower than that from the control group ( $P<0.05$ ); 1.0% L-Arg supplementation increased plasma concentrations of methionine, arginine, ornithine and proline at day 90 of gestation, and serum level of IgG at day 110 of gestation compared to the control group ( $P<0.05$ ); plasma concentrations of methionine, arginine, ornithine and proline from the 1.0% L-Arg supplementation group were higher than those from the control group at day 90 of gestation ( $P<0.05$ ). However, all of the measured indices did not differ between the 1.0% L-Arg and 0.1% NCG supplementation groups ( $P>0.05$ ), but plasma concentrations of methionine, arginine and ornithine from the 1.0% L-Arg supplementation group were significantly higher than those

#### Service

- [把本文推荐给朋友](#)
- [加入我的书架](#)
- [加入引用管理器](#)
- [Email Alert](#)
- [RSS](#)

#### 作者相关文章

from the 0.1% NCG supplementation group at day 90 of gestation ( $P<0.05$ ). The results of this study indicate that dietary L-Arg or NCG supplementation can improve the reproductive performance of pregnant sows by improving the utilization of amino acids and immune function. [Chinese Journal of Animal Nutrition, 2011, 23 (8) : 1351 -1360]

Keywords: L-Arg, NCG, PRRSV, pregnant sows, reproductive performance, immune

通讯作者 吴德, 教授, 博士生导师, E-mail: pig2pig@sina.com

作者简介: 杨平(1986—), 男, 四川成都人, 硕士研究生, 从事动物营养与饲料开发研究。E-mail: yp20041107@163.com

#### 引用本文:

. 饲料添加L-精氨酸或N-羧甲基谷氨酸对感染PRRSV妊娠母猪繁殖性能及免疫功能的影响[J]. 动物营养学报, 2011,V23(08): 1351-1360

. Effects of Dietary L-arginine or N-carbamylglutamate Supplementation on Reproductive Performance and Immune Function of PRRSV-infected Pregnant Sows[J]. Chinese Journal of Animal Nutrition, 2011,V23(08): 1351-1360.

#### 链接本文:

[http://211.154.163.124/Jweb\\_dwyy/CN/10.3969/j.issn.1006-267x.2011.08.014](http://211.154.163.124/Jweb_dwyy/CN/10.3969/j.issn.1006-267x.2011.08.014) 或  
[http://211.154.163.124/Jweb\\_dwyy/CN/Y2011/V23/I08/1351](http://211.154.163.124/Jweb_dwyy/CN/Y2011/V23/I08/1351)

- [1] MENGELING W L, LAGER K M, VORWALD A C. Temporal characterization of transplacental infection of porcine fetuses with porcine reproductive and respiratory syndrome virus[J]. American Journal of Veterinary Research, 1994, 55(10):1391-1398.
- [2] MATEO R D, WU G, BAZER F W, et al. Dietary L-arginine supplementation enhances the reproductive performance of gilts[J]. The Journal of Nutrition, 2007, 137(3):652-656.
- [3] RAMAEKERS P, KEMP B, VAN DER LENDE T. Progenos in sows increases number of piglets born[J]. Journal of Animal Science, 2006, 84 (Suppl.1): 394.(Abstract)
- [4] LI X, BAZER F W, GREGORY A J, et al. Dietary supplementation with 0.8% L-arginine between days 0 and 25 of gestation reduces litter size in gilts[J]. The Journal of Nutrition, 2010, 140(6):1111-1116.
- [5] QIAO S F, LU T J, SUN J B, et al. Alterations of intestinal immune function and regulatory effects of L-arginine in experimental severe acute pancreatitis rats[J]. World Journal of Gastroenterol, 2005, 11(39):6216-6218.
- [6] LEWIS B, LANGKAMP-HENKEN B. Arginine enhances in vivo immune responses in young, adult and aged mice[J]. Nutrition, 2000, 130(7):1827-1830.
- [7] DOURMAD J Y, ETIENNE M, VALANCOGNE A, et al. InraPorc: A model and decision support tool for the nutrition of sows[J]. Animal Feed Science and Technology, 2008, 143(1):372-386.
- [8] WU G, BAZER F W, CUDD T A, et al. Pharmacokinetics and safety of arginine supplementation in animals[J]. The Journal of Nutrition, 2007, 137 (6):1673S-1680S.
- [9] 曹洪志,颜其贵,李成贤.三联PCR诊断猪3种繁殖障碍疾病的方法研究[J].四川畜牧兽医,2010(7):20-22.
- [10] WU G, OTT T L, KNABE D A, et al. Amino acid composition of the fetal pig[J]. The Journal of Nutrition, 1999; 129(5):1031-1038.
- [11] WU G, BAZER F W, TUO W, et al. Unusual abundance of arginine and ornithine in porcine allantoic fluid[J]. Biology of Reproduction, 1996, 54 (6):1261-1265.
- [12] ZENG X, WANG F, FAN X, et al. Dietary arginine supplementation during early pregnancy enhances embryonic survival in rats[J]. The Journal of Nutrition, 2008, 138(8):1421-1425.
- [13] WU G, BAZER F W, WALLACE J M, et al. Intrauterine growth retardation: implications for the animal sciences[J]. Journal of Animal Science, 2006, 84(9):2316-2337.
- [14] WU G, BAZER F W, CUDD T A, et al. Maternal nutrition and fetal development[J]. The Journal of Nutrition, 2004, 134(9):2169-2172.
- [15] WU G, BAZER F W, HU J, et al. Polyamine synthesis from proline in the developing porcine placenta[J]. Biology of Reproduction, 2005, 72 (4):842-850.
- [16] WU G, JAEGER L A, BAZER F W, et al. Arginine deficiency in preterm infants: biochemical mechanisms and nutritional implications[J]. The Journal of Nutritional Biochemistry, 2004, 15(8):442-451.
- [17] WU G, MORRIS S M Jr. Arginine metabolism: nitric oxide and beyond[J]. Biochemical Journal, 1998, 336(Part 1): 1-17.
- [18] KOHLI R, MEININGER C J, HAYNES T E, et al. Dietary L-arginine supplementation enhances endothelial nitric oxide synthesis in streptozotocin-induced diabetic rats[J]. The Journal of Nutrition, 2004, 134(3):600-608.
- [19] KWON H, WU G, MEININGER C J, et al. Developmental changes in nitric oxide synthesis in the ovine placenta[J]. Biology of Reproduction, 2004, 70(3):679-686.
- [20] KIM S W, WU G, BAKER D H. Amino acid nutrition of breeding sows during gestation and lactation[M]. Pigs News Inform, 2005, 26:N89-N99.
- [21] KIM S W, MCPHERSON R L, WU G. Dietary arginine supplementation enhances the growth of milk-fed young pigs[J]. The Journal of Nutrition, 2004, 134(3):625-630.

[22] DOUILLARD J Y, BENNOUNA J, VAVASSEUR F, et al. Phase I trial of interleukin-2 and high-dose arginine butyrate in metastatic colorectal cancer[J]. Cancer Immunol Immunother, 2000, 49(1):56-61.

[23] 麻名文,李福昌.日粮精氨酸水平对断奶~2月龄肉兔生长性能、免疫器官指数及血清指标的影响[J].动物营养学报,2009,21(3): 405-410.

[24] ALBINA E, PIRIOU L, HUTET E, et al. Immune responses in pigs infected with porcine reproductive and respiratory syndrome virus (PRRSV)[J]. Veterinary Immunology and Immunopathology, 1998, 61(1):49-66.

[25] MEIER W A, GALEOTA J, OSORIO F A, et al. Gradual development of the interferon-gamma response of swine to porcine reproductive and respiratory syndrome virus infection or vaccination[J]. Virology, 2003, 309(1):18-31.

[26] SURADHAT S, THANAWONGNUWECH R, POOVORAWAN Y. Upregulation of IL-10 gene expression in porcine peripheral blood mononuclear cells by porcine reproductive and respiratory syndrome virus[J]. Journal of General Virology, 2003, 84:453-459.

[27] 尤昭玲,刘慧萍,雷磊,等.正常妊娠与自然流产模型小鼠Th1/Th2型细胞因子表达的差异[J].中国中医药科技,2009,16(2):133-134.

[1] 梁英,任成财,姜宁,滕占才,毕洪梅,金迪.黄芩黄酮对肉仔鸡生长性能和免疫功能的影响[J]. 动物营养学报, 2011,23(08): 1409-1414

[2] 杨小军,王筱霏,尹瑞卿,姚军虎.功能性多糖与家禽肠道黏膜免疫调控的构效关系[J]. 动物营养学报, 2011,23(07): 1089-1093

[3] 江雪梅,吴德,方正锋,谯仕彦,林燕,车炼强.饲料添加L-精氨酸或N-氨甲酰谷氨酸对经产母猪繁殖性能及血液参数的影响[J]. 动物营养学报, 2011,23(07): 1185-1193

[4] 张志强,张铁涛,耿业业,高秀华,杨福合,邢秀梅.饲料蛋白质水平对雌性蓝狐繁殖性能的影响[J]. 动物营养学报, 2011,23(07): 1253-1258

[5] 洪宇,刘玉兰,吴志锋,朱惠玲,侯永清,丁斌鹰.鱼油对仔猪生产性能、炎性介质和下丘脑-垂体-肾上腺轴激素的影响[J]. 动物营养学报, 2011,23(06): 937-942

[6] 刘婷婷,张帅,邓斐月,曹广添,陈安国,杨彩梅.谷氨酰胺与丁酸梭菌对断奶仔猪生长性能、免疫功能、小肠形态和肠道菌群的影响[J]. 动物营养学报, 2011,23(06): 998-1005

[7] 林仕梅,潘瑜,罗莉,马霞,詹若蕊,毛述宏.不同来源微量元素铁、锌、锰、铜对罗非鱼生长、代谢和非特异性免疫力的影响[J]. 动物营养学报, 2011,23(05): 763-770

[8] 许丹丹,黄燕华,曹俊明,蓝汉冰,王国霞,张荣斌,陈晓瑛,严晶.饲料中添加核苷酸混合物对凡纳滨对虾幼虾非特异性免疫和抗氧化指标的影响[J]. 动物营养学报, 2011,23(05): 828-835

[9] 谭建庄,刘莎莎,孙哲,张宏福,卢庆萍,萨仁娜,赵峰,杨晓光.抗草甘膦转基因豆粕对肉仔鸡肠黏膜免疫的影响[J]. 动物营养学报, 2011,23(05): 836-841

[10] 黄春喜,袁建敏,周淑亮,王波.牛磺酸对肉仔鸡生长性能、消化器官和免疫器官发育的影响[J]. 动物营养学报, 2011,23(05): 854-861

[11] 沈文英,李卫芬,梁权,邓斌,陈南南,周绪霞.饲料中添加枯草芽孢杆菌对草鱼生长性能、免疫和抗氧化功能的影响[J]. 动物营养学报, 2011,23(05): 881-886

[12] 吴旋,白东清,朱国霞,宁博.长期投喂黄芪多糖对黄颡鱼免疫细胞活性的影响[J]. 动物营养学报, 2011,23(05): 887-892

[13] 杨小然,王安,郭志杰.牛磺酸对笼养蛋雏鸭生长性能、抗氧化功能及免疫器官发育的影响[J]. 动物营养学报, 2011,23(05): 807-812

[14] 黎观红,洪智敏,贾永杰,瞿明仁.抗菌肽的抗菌作用及其机制[J]. 动物营养学报, 2011,23(04): 546-555

[15] 温安祥1,周定刚2\*.谷氨酰胺对内毒素刺激下中华鳖免疫功能和生产性能的影响[J]. 动物营养学报, 2011,23(04): 662-669