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饲粮锌添加水平对繁殖期雄性水貂繁殖性能、营养物质消化率及氮代谢的影响

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Effects of Dietary Zinc Supplemental Level on Reproductive Performance, Nutrient Digestibility and Nitrogen Metabolism of Reproducing Male Minks

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摘要 本试验旨在研究饲粮锌添加水平对繁殖期雄性水貂繁殖性能、营养物质消化率及氮代谢的影响.选择健康后备种雄性水貂60只,随机分成5组,每组12个重复,每个重复1只貂.各组水貂分别饲喂锌添加水平为0(Ⅰ组)、50(Ⅱ组)、100(Ⅲ组)、200(Ⅳ组)、400 mg/kg(Ⅴ组)的试验饲粮.预试期7 d,正试期120 d.结果表明:1)Ⅰ组精子活力极显著低于Ⅱ组和Ⅲ组($P<0.01$),显著低于Ⅴ组($P<0.05$);Ⅰ组睾丸直径极显著小于Ⅱ组($P<0.01$),显著小于Ⅲ组($P<0.05$);Ⅰ组公貂成功配种次数极显著小于Ⅲ组($P<0.01$),显著小于Ⅱ组和Ⅳ组($P<0.05$).2)各组干物质采食量、脂肪消化率差异不显著($P>0.05$);Ⅲ组干物质排出量显著高于Ⅰ组($P<0.05$);Ⅱ组干物质消化率极显著高于Ⅴ组($P<0.01$),显著高于Ⅳ组($P<0.05$);Ⅱ组和Ⅲ组蛋白质消化率显著高于Ⅴ组($P<0.05$).3)各组食入氮、尿氮、氮沉积、净蛋白质利用率、蛋白质生物学价值均差异不显著($P>0.05$).由此可见,饲粮锌添加水平为50~100 mg/kg(总锌水平140~190 mg/kg)时,水貂的繁殖性能较为理想.饲粮锌添加水平为100 mg/kg(总锌水平190 mg/kg)时,水貂的干物质采食量较高.饲粮锌添加水平对水貂的干物质采食量、脂肪消化率、氮沉积、净蛋白质利用率及蛋白质生物学价值影响不显著.

关键词: 锌 饲粮 水貂 繁殖性能 消化率

Abstract: This experiment was conducted to study the effects of dietary zinc supplemental level on reproductive performance, nutrient digestibility and nitrogen metabolism of reproducing male minks. Sixty healthy male minks were randomly divided into 5 groups with 12 replicates per group and 1 mink per replicate. The minks in the 5 groups were fed experimental diets with zinc supplemental levels of 0 (group Ⅰ), 50 (group Ⅱ), 100 (group Ⅲ), 200 (group Ⅳ) and 400 mg/kg (group Ⅴ), respectively. The pre-test period lasted for 7 days and the trial period lasted for 120 days. The results showed as follows: 1) the sperm motility in group Ⅰ was significantly lower than that in groups Ⅱ and Ⅲ ($P<0.01$), and was significantly lower than that in group Ⅴ ($P<0.05$). The testicular diameter in group Ⅰ was significantly smaller than that in groups Ⅱ ($P<0.01$) and Ⅲ ($P<0.05$). The successful mating times on male mink in group Ⅰ was significantly lower than that in group Ⅲ ($P<0.01$), and was significantly lower than that in groups Ⅱ and Ⅳ ($P<0.05$). 2) There were no significant differences in the dry matter (DM) intake and fat digestibility among all groups ($P>0.05$). The DM output in group Ⅲ was significantly higher than that in group Ⅰ ($P<0.05$); the DM digestibility in group Ⅱ was significantly higher than that in group Ⅴ ($P<0.01$), and was significantly higher than that in group Ⅳ ($P<0.05$); the protein digestibility in groups Ⅱ and Ⅲ was significantly higher than that in group Ⅴ ($P<0.05$). 3) There were no significant differences in the nitrogen intake, urine nitrogen, nitrogen deposition, net protein utilization and biological value of protein among all groups ($P>0.05$). In conclusion, when the zinc supplemental level arrives at 50 to 100 mg/kg (total zinc level is 140 to 190 mg/kg), the reproductive performance of minks is more ideal. When the zinc supplemental level arrives at 100 mg/kg (total zinc level is 190 mg/kg), the DM intake of minks is higher. Dietary zinc supplemental level has no effect on DM intake, fat digestibility, nitrogen deposition, net protein utilization and biological value of protein in minks.

Keywords: zinc, diet, mink, reproductive performance, digestibility

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[1] SCOTT M L.Nutrition of the chicken[M].3rd ed.New York:Ithaca,1982.

[2] BRANDAO N J,STEFAN V,MENDOCA B B,et al.The essential role of zinc in growth[J].Nutrition Reviews,1995,15(3):335-358.

[3] MARIA J S,MARCELA B S,ZUBILLAGA B.The role of zinc in the growth and development of children[J].Nutrition,2002,18:510-519.

[4] MOHAMMAD S K,SAFEER Z,MOHAMMAD S,et al.Assessment of the level of trace element zinc in seminal plasma of males and evaluation of its role in male infertility[J].Original Article,2011,1(2):93-96.

[5] SAEED S,KHAN F A,REHMAN S B,et al.Biochemical parameters in evaluation of oligospermia[J].Journal of the Pakistan Medical Association,1994;44:137-140.

[6] 张拴林,黄应祥,岳文斌.锌对雄性动物生殖的影响[J].黄牛杂志,2001,27(1):38-40.

[7] PITTS W J,MILLERS W J,FOSGATE O T.Effect of zinc deficiencies and restricted feeding from two to five months of age on reproduction in Holstein bulls[J].Journal of Dairy Science,1966,49:995-1000.

[8] 王宗元.动物矿物质营养代谢与疾病[M].上海:上海科技文献出版社,1995.

[9] SUNDQVIST C.Recent male mink reproduction studies and some prospects for the future[J].Scientifur,1986,10:261-264.

[10] ONSTAD O.Studies on postnatal testicular changes,semen quality and anomalies of reproductive organs in the mink[J].Acta Endocrinol (Copenh),1967(Suppl.):1-117.

[11] POMYTKO V N,BERNATSKII V G,KRUGLOVA N M,et al.Semen collection,dilution and storage and artificial insemination in mink[J].Nauchno-Issledovatel skii Institut Pushnogo Zverovodstvai Krolikovodstva,1972,11:165-170.

[12] 刘惠芳.微量元素锌影响动物繁殖性能的机理[J].畜禽业,2003(7):31-32.

[13] BJORNDAHL L,KVIST U.Human sperm chromatin stabilization:a proposed model including zinc bridges[J].Molecular Human Reproduction,2010,16:3-29.

[14] EDER K,KIRCHGES S M.Zinc deficiency and concentrations of lipids in plasma and lipoproteins of rats force fed a diet with linseed oil[J].Trace Elements Elecrilytes,1994(11):92.

[15] MARTIN G B,WHITE C L,MARKEY C M,et al.Effects of dietary zinc deficiency on the reproductive system of young male sheep:testicular growth and the secretion of inhibin and testosterone[J].Journal of Reproduction and Fertility,101(3):87-96.

[16] 马群山,高玉海.微量元素对种公畜性机能的影响[J].动物科学与动物医学,2001,16(5):19-20.

[17] 王宏辉,李愉鑫,王昆山,等.高海拔条件下锌硒对猪繁殖性能的影响[J].当代畜牧,2001(5):36-37.

[18] VENGE O.Cyclical changes in testis and influence of additional light exposure on fertility in mink //International Congress on Animal Reproduction and Artificial Insemination,Paris: ,1968:341-344.

[19] HERON L,RIETVELD A A.Is there a correlation between testicle size and reproductive performance?[J].Scientifur,1985,9(4):296.

[20] 李忠宽,李红.雄性水貂繁殖力的估测方法及提高水貂繁殖力的措施[J].经济动物学报,1993(4):41-43.

[21] SUNDERMAN F W.Regulation of gene expression by metal ions:zinc finger loop domains in hormone receptors,transcription factors,and proteins encoded on cogenes[J].Trace Elements in Medicine,1990,7(1):47-55.

[22] 绪广林,钱之玉.缺锌对雄性大鼠生殖系统影响的试验研究[J].微量元素与健康研究,2000,17(4):5-7.

[23] HUNT C D,JOHNSON P E,HERBEL J,et al.Effects of dietary zinc depletion on seminal volume and zinc loss,serum testosterone concentrations,and sperm morphology in young men[J].The American Journal of Clinical Nutrition,1992,56(1):148-157.

[24] 谭中荣,卢光进,郭小芳,等.349例男性不育症患者精液Zn含量与临床分析[J].微量元素与健康研究,1998,15(2):23-24.

[25] ROSSIL P,RUTZ F,ANCIUTI M A,et al.Influence of graded levels of organic zinc on growth performance and carcass traits of broilers[J].The Journal of Applied Poultry Research,2007,16(2):219-225.

[26] 蒋宗勇,刘小雁,蒋守群,等.1-2日龄黄羽肉鸡锌需要量的研究[J].动物营养学报,2010,22(2):301-309.

[27] 马七军,赵志恭,王守清.饲草饲料中锌含量的测定及补锌对奶山羊生产性能和消化代谢的影响[J].动物营养学报,1990,2(1):63.

[28] 任二军,蒋清奎,刘进军,等.日粮不同锌添加水平对育成期雄性水貂消化代谢、生长性能和血清生化指标的影响[J].中国畜牧兽医,2012,39(6):22-25.

[29] 王淑明,张敏,封洋,等.不同锌水平对水貂生产性能及营养物质消化率的影响[J].经济动物学报,2009,13(4):207-210.

[30] 索宝.内蒙古白绒山羊生长羯羊锌需要量的研究 .硕士学位论文.呼和浩特:内蒙古农业大学,2006.

[31] KERR B J,MCKEITH F K,EASTER R A.Effect on performance and carcass characteristics of nursery to finisher pigs fed reduced crude protein amino acid supplemented diet[J].Journal of Animal Science,1995,73:433-440.

[32] NEWWLL C W.Nutrient floe and manure management in the mink industry .Ph.D.Thesis.Halifax,N.S.:Dalhousie University,1999.

[33] 吴学壮,张铁涛,崔虎,等.饲粮添加铜水平对育成期水貂生长性能、营养物质消化率及氮代谢的影响[J].动物营养学报,2012,24(6):1078-1084.

[1] 杨鹏, 吴德, 车炼强, 王军, 方正锋, 林燕, 徐盛玉.妊娠期营养水平对初产母猪繁殖性能和乳成分的影响[J]. 动物营养学报, 2013,25(9): 1954-1962

[2] 张凯, 丁雪梅, 白世平, 曾秋凤, 罗玉衡, 朱庆, 张克英.饲粮策略对不同遗传品系二郎山山地鸡生产性能和屠宰性能的影响[J]. 动物营养学报, 2013,25(9): 1963-1975

[3] 翁秀秀, 张养东, 李发弟, 周凌云, 卜登攀.不同类型饲粮饲喂下奶牛瘤胃乳头的光镜和透射电镜观察[J]. 动物营养学报, 2013,25(9): 1998-2004

[4] 陈明洪, 段杰林, 尹杰, 刘金艳, 李铁军, 方俊.谷氨酸和精氨酸对饲喂霉变饲粮育肥猪所受损伤的缓解作用[J]. 动物营养学报, 2013,25(9): 2101-2110

[5] 杨俊, 王之盛, 保善科, 王威, 薛白, 张海波, 邹华围.精料补充料能量水平对早期断奶犊牦牛生产性能和营养物质表观消化率的影响[J]. 动物营养学报, 2013,25(9): 2021-2027

[6] 荆祎, 李光玉, 刘晗璐, 杨雅涵, 鲍坤, 李志鹏.不同乳酸杆菌添加剂对水貂生长性能、营养物质消化率、氮平衡及血清生化指标的影响[J]. 动物营养学报, 2013,25(9): 2160-2167

[7] 刘进军, 刘洁, 任二军, 李亚青, 李晓华.饲粮锌源与水平对冬毛期公貂体重、营养物质消化率及氮代谢的影响[J]. 动物营养学报, 2013,25(9): 2168-2173

[8] 刘志, 张铁涛, 郭强, 吴学壮, 高秀华, 杨福合, 邢秀梅.饲粮铜水平对育成期蓝狐生长性能、营养物质消化率及氮代谢的影响[J]. 动物营养学报, 2013,25(7): 1497-1503

[9] 耿梅, 姜建阳, 韩先杰, 宋春阳.纤维素组合酶在不同品种生长猪饲粮中的适宜添加量[J]. 动物营养学报, 2013,25(7): 1541-1550

[10] 汤海鸥, 高秀华, 李学军, 王晓睿.低能饲粮中添加高剂量复合酶对肉鸡生长性能、养分利用率和器官指数的影响[J]. 动物营养学报, 2013,25(6): 1338-1345

[11] 张拴林, 袁霞, 徐亚光, 聂玉梅, 武晋孝, 程建国, 杨致玲, 黄应祥.硒和维生素E对肉牛养分表观消化率、氮平衡、能量代谢及血液生化指标的影响[J]. 动物营养学报, 2013,25(6): 1219-1228

[12] 李振, 万发春, 刘晓牧, 姜淑贞, 杨在宾, 杨维仁, 张桂国, 张相伦.不同加工工艺小麦对肉牛养分消化率、小肠消化酶活性及血清代谢产物含量的影响[J]. 动物营养学报, 2013,25(6): 1229-1236

[13] 张亚男, 武书庚, 张海军, 岳洪源, 齐广海.锌添加水平对蛋鸡生产性能和蛋壳品质的影响[J]. 动物营养学报, 2013,25(5): 1093-1098

[14] 陈苗璐, 王宝维, 张名爱, 岳斌, 葛文华, 王迪, 王姣, 孟苓凤.饲粮锌水平对鹅生长性能、血清生化指标及激素含量的影响[J]. 动物营养学报, 2013,25(5): 1105-1112

[15] 刘佰阳, 李光玉, 鲍坤, 刘晗璐, 李丹丽, 顾东, 张涛.棉籽低聚糖对水貂生长性能、营养物质消化代谢、肠道菌群和免疫性能的影响[J]. 动物营养学报, 2013,25(5): 1123-1130