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妊娠后期营养限饲蒙古绵羊对其胎儿生长发育及血液生理生化指标的影响

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Maternal Undernutrition during Late Pregnancy: Effects on Growth Development and Physiological and Biochemical Indexes in Blood of Mongolia Ovine Fetus

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摘要 本试验旨在研究妊娠后期营养限饲蒙古绵羊对其胎儿生长发育及血液生理生化指标的影响。选择健康的蒙古绵羊(经同期发情受孕)42只,在妊娠90 d时选择6只母羊进行屠宰,[JP2]其余分为3个代谢能水平组:0.175 MJ/(kg BW^{0.75}·d)组(RG1: n=14)、0.330 MJ/(kg BW^{0.75}·d)组(RG2: n=12)和自由采食组[CG: 0.670 MJ/(kg BW^{0.75}·d), n=10],继续饲喂。妊娠140 d时,每组再选择6只母羊进行屠宰,快速取出胎儿,测定胎儿体重、体尺及血液生理生化指标。结果表明:RG1胎儿体重($P<0.01$)、体长($P<0.05$)、胸围($P<0.05$)、腹围($P<0.05$)、曲冠臀长($P<0.01$)、红细胞数($P<0.01$)、血红蛋白含量($P<0.01$)、红细胞压积($P<0.01$)、总氨基酸含量($P<0.05$)、总抗氧化能力($P<0.01$)、超氧化物歧化酶活性($P<0.05$)显著低于CG,而红细胞分布宽度变异系数($P<0.05$)、平均血小板体积($P<0.05$)、非酯化脂肪酸含量($P<0.05$)、 β -羟基丁酸含量($P<0.01$)、谷胱甘肽过氧化物酶活性($P<0.05$)、丙二醛含量($P<0.05$)显著高于CG;RG2胎儿体重($P<0.01$)、总抗氧化能力($P<0.05$)显著低于CG,而平均血小板体积显著高于CG($P<0.05$)。结果提示,妊娠后期营养限饲蒙古绵羊严重限制了其胎儿的生长发育,RG1胎儿产生营养性贫血,营养代谢失调,发生氧化应激。

关键词: 营养限饲 胎儿发育 血常规参数 代谢产物 抗氧化能力

Abstract: This study was carried out to investigate the effects of maternal undernutrition during late pregnancy on growth development and physiological and biochemical indexes in blood of Mongolia ovine fetus. A total of 42 healthy Mongolia ewes mated at a synchronized estrus were selected. Six ewes were slaughtered at the beginning of the experiment (90 d of gestation) and the remained animals were allocated to three metabolizable energy (ME) level groups: restricted group 1 [RG1, 0.175 MJ/(kg BW^{0.75}·d), n=14], restricted group 2 [RG2, 0.330 MJ/(kg BW^{0.75}·d), n=12] and control group [CG, *ad libitum*, 0.670 MJ/(kg BW^{0.75}·d), n=10]. At 140 d of gestation, six ewes in each group were slaughtered, quickly removed the fetus, and measured the fetal body weight, body measurements, physiological and biochemical indexes in blood. The results showed as follows: fetal weight ($P<0.01$), body length ($P<0.05$), chest circumference ($P<0.05$), abdominal circumference ($P<0.05$), curved crown-rump length ($P<0.01$), red blood cell count ($P<0.01$), hemoglobin content ($P<0.01$), hematokrit ($P<0.01$), total amino acid content ($P<0.05$), total antioxidation capacity ($P<0.01$) and superoxide dismutase activity ($P<0.05$) were significantly decreased and average platelet volume ($P<0.05$), coefficient of variation of red blood cell distribution width ($P<0.05$), nonesterified fatty acid content ($P<0.05$), β -hydroxybutyrate content ($P<0.01$), glutathione peroxidase activity ($P<0.05$) and malonaldehyde content ($P<0.05$) were significantly enhanced in RG1 compared with CG. For RG2, the decrease of fetal body weight ($P<0.01$) and total antioxidation capacity ($P<0.05$) was founded and average platelet volume was increased compared with CG ($P<0.05$). In conclusion, the fetal growth and development are affected seriously by maternal undernutrition during late pregnancy, which leads to severe malnourished anaemia, nutritional and metabolic disorder, and oxidative stress of fetus in RG1.

Keywords: nutrition restriction, fetal development, blood routine parameters, metabolites, antioxidant capacity

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