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谷氨酰胺和L-肉碱对低温下肉羊瘤胃纤维分解菌的影响

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Effects of Glutamine and L-carnitine on Ruminal Cellulolytic Bacteria of Sheep under Low Temperatures

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摘要

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摘要 本试验研究了饲料中添加谷氨酰胺和L-肉碱对低温下肉羊瘤胃纤维素分解菌的影响,旨在了解谷氨酰胺和L-肉碱在减缓低温应激中的作用,为生产实践中应用抗应激剂提供理论依据和参考。试验选用9只健康东北细毛羊×德国肉用美利奴杂交肉羊,采用L9(34)正交试验设计,设3个谷氨酰胺水平(0、0.6%、1.2%)与3个L-肉碱水平(0、75、150 mg/kg)。试验羊在低于正常饲养温度(由10℃降至0℃)条件下,饲喂添加不同水平谷氨酰胺和L-肉碱的饲料。结果表明,谷氨酰胺有降低瘤胃白色瘤胃球菌相对含量的趋势($P>0.05$),L-肉碱能显著降低瘤胃白色瘤胃球菌的相对含量($P<0.05$),二者复合使用有缓解瘤胃白色瘤胃球菌相对含量下降的趋势;谷氨酰胺能显著提高瘤胃黄化瘤胃球菌相对含量($P<0.05$),L-肉碱有提高瘤胃黄化瘤胃球菌相对含量的趋势($P>0.05$),二者复合使用能进一步提高瘤胃黄化瘤胃球菌的相对含量($P>0.05$);谷氨酰胺和L-肉碱有降低瘤胃产琥珀酸丝状杆菌相对含量的趋势($P>0.05$),但二者复合使用有缓解瘤胃产琥珀酸丝状杆菌相对含量下降的趋势。结果提示:谷氨酰胺和L-肉碱在低温下复合使用能缓解瘤胃白色瘤胃球菌、产琥珀酸丝状杆菌相对含量的下降,提高瘤胃黄化瘤胃球菌相对含量。经比较分析,低温环境下肉羊饲料谷氨酰胺和L-肉碱的添加量分别为1.2%和75 mg/kg时可有效改变瘤胃微生物菌群,提高机体抵抗冷应激的能力。

关键词: 低温;谷氨酰胺;L-肉碱;瘤胃纤维分解菌

Abstract: The study was conducted to explore the effects of dietary glutamine and L-carnitine supplementation on the alleviation of cold stress and ruminal cellulolytic bacteria of sheep, and also to provide theoretical evidence and useful reference for the application of anti-stress agent in practice. Nine healthy North East China Merino×German Mutton Merino sheep were selected and L9(34) orthogonal design was adopted which included three glutamine levels (0, 0.6%, 1.2%) and three L-carnitine levels (0, 75, 150 mg/kg) in this experiment. The sheep were bred under low ambient temperatures (from 10 °C to 0 °C), and fed different levels of glutamine and L-carnitine supplemental diets. The results were showed as follows: glutamine had a trend to decrease the relative content of Ruminococcus albus (RA) in rumen ($P>0.05$), L-carnitine could significantly decrease the relative content of RA in rumen ($P<0.05$), but glutamine combined with L-carnitine had a trend to relieve the RA decreasing; glutamine could significantly increase the relative content of Ruminococcus flavefaciens (RF) in rumen ($P<0.05$), L-carnitine had a trend to increase the relative content of RF in rumen ($P>0.05$), but glutamine combined with L-carnitine could further increase RF in rumen; glutamine and L-carnitine had a trend to decrease the relative content of Bacteroides succinogenes (BS) in rumen ($P>0.05$), but glutamine combined with L-carnitine had a trend to relieve the BS decreasing. The results suggest that glutamine combined with L-carnitine can relieve the relative contents of RA and BS decreasing, and further increase RF in rumen of sheep under low temperatures. It is known from the results that sheep can get effective changes of the rumen microflora and the ability to resist cold stress when fed diets supplemented with 1.2% glutamine and 75 mg/kg L-carnitine. [Chinese Journal of Animal Nutrition, 2011, 23 (3) : 499-505]

Keywords: low temperatures; glutamine; L-carnitine; rumen cellulolytic bacteria

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