RELATIONSHIP BETWEEN PERINATAL NUTRITION OF COWS AND IMMUNITY OF NEONATAL CALVES

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Introduction: Incidence of weak calf syndrome (WCS) which is characterized by low weight, immaturity of organs and suppression of immune system in neonatal calves is increasing. Although WCS has been linked to many factors, it is indicated that nutritional deficiency of cows may cause suppression of immune system in neonatal calves and result in WCS. The purpose of this study is to clarify the relationship between the levels of perinatal NUTRITION in cows, especially amino acids, and immune system of neonatal calves.

Materials and methods: Thirty cows and their calves were used. They were observed clinical findings and collected blood samples from 2 to 5 days after parturition. Blood samples were used to measure the blood biochemical examination and plasma amino acid concentrations. Calves were divided into 3 groups dependent on thymic scores (Score1: hypoplasia, Score2: normal, Score3: excellent). Some calves were analyzed the white blood cell population to evaluate the relationship with plasma amino acid concentration.

Results: Score 1 calves showed hypoproteinemia following the low gamma globulin (1.28 g/100ml), and plasma amino acid concentrations (methionine: 48 nM/ml, leucine: 182 nM/ml, isoleucine: 122 nM/ml, lysine: 158 nM/ml, arginine: 147 nM/ml). The cows delivering score 1 calves showed a low level of blood urea nitrogen (6.7 mg/100ml), total cholesterol (100.4 mg/100ml) and plasma amino acid concentrations (methionine: 39 nM/ml, lysine: 148 nM/ml, arginine: 82 nM/ml). There were significant correlations between MHC classII⁺CD14⁻ cells and plasma isoleucine and leucine concentrations in the calves.

Conclusions: The cows with decreased levels of blood urea nitrogen, total cholesterol and plasma amino acid concentrations, were at increased risk of the thymic hypoplasia in their calves. Furthermore, it is suggested that the calves with low plasma amino acid concentrations may have decreased B cell function.