

## **Effects of management practices and nutrition on the welfare and productivity of dairy sheep**

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An increasing body of literature has shown that various management and nutritional practices can markedly impact the welfare and productivity of dairy sheep. Improper management practices or inappropriate animal-human interactions can induce negative emotional and physical stresses and thus reduce milk yield and increase somatic cell count in milk, an indirect indicator of stress. These problems are aggravated, especially during the milking period, in breeds with a nervous temperament. Other management factors, such as inadequate milking procedures, inappropriate milk equipment functioning or settings (e.g., vacuum level) can impair the welfare and impact negatively on milk production traits. Heat and cold stress, isolation or regrouping can also influence behavior, immune responses, performances and udder health conditions of ewes. Poor ventilation systems and insufficient space allowance might increase noxious gases, air ammonia, and airborne microorganisms, inducing alterations of milk yield and quality. All these factors can interact with nutritional stresses, inducing further problems. Of particular interest are the nutritional challenges during the transition from pregnancy to lactation, especially in the case of high yielding ewes. Major concerns are improper status of body reserves, unbalanced carbohydrates, proteins, mineral, and water scarcity or quality. During mid-late lactation, nutritional stresses due to energy unbalances are less likely, even though the type of carbohydrates can markedly affect productive responses, with starchy diets favouring more body reserves accumulation than milk production. Protein excess and shortages are more likely. They can be easily controlled by using milk urea and the condition of the feces as nutritional indicators. Throughout the lactation, micronutrient unbalances can induce significant increases in the milk somatic cell count, suggesting an induction of nutritional-derived stresses. Various indicators of appropriate feeding and management practices can help in assessing dairy sheep welfare and limiting possible negative effects on productivity.

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