ESTIMATIUN OF BIOMASS MOISTURE AT GRASS HARVESTING

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Moisture of biomass during grass harvesting of herbaceous coarse-fodder feeds is of decisive importance when selecting feed preparation technologies and their regime parameters. Errors in the determination of moisture can lead to incorrect solutions and significant losses in the quality of the prepared feed. The use of devices of different physical nature entails two types of errors. The first one is related to the instrumental errors of the measurement method, and the second one is due to the distribution of the measurement object parameters, which is a grass stand distributed over the area of the field, or a roller with a length of several kilometers. Under these conditions, it is expedient to use remote sensing equipment (RS), which is a modern high-performance measuring instrument, for estimating the moisture content of the harvested biomass. The implementation of such a measurement method encounters the underdevelopment of its information theory. In this paper we propose a methodology and software-algorithmic means for its implementation. The basis of the proposed methodology is mathematical models of optical measurement (remote sensing) and dynamics of biomass state parameters. An important feature of the problem being solved is the use of models of state parameters at different time scales. Such models have the same structure, which makes it possible to use for the optimal estimation of the same structure of algorithms or for estimating the state parameters. All algorithms used in the methodology are tested on real experimental data, which confirms the operability of the proposed theory.

Keywords: perennial grasses, biomass structure, mathematical models, remote sensing, optimal estimation.