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Acoustic radiation forces in monitoring of milk composition

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High sensitivity of ultrasonic velocity and attenuation to composition and state of milk and other liquid food products is now well established. Unfortunately, existing devices include measurements of the acoustic properties of milk at different temperatures and therefore require waiting for temperature equilibration of the milk when the sample is heated or cooled and cannot be used for real-time monitoring. In this paper ultrasonic particles analyzer of NDT Instruments, AcoMilk-02, used for continuous monitoring of fat globules and somatic cells of raw milk in computerized milking station of cowsheds has been described. This device is based on high intensity standing wave for preliminary separation and concentration of the fat globules and somatic cells by the acoustic radiation forces and low intensity standing wave to measure their content. Testing of analyzer was carried out on 5 cows during one-month period. It was found that milk production level, stage of lactation, and outside temperature have significant influence on the milk composition. Continuous monitoring of milk fat and somatic cells count that typically have high day-to-day variation, provide a much-needed tool for dairy management and for veterinary diagnostic purposes.