Opportunities and Challenges in Statistical Analysis of High-Throughput Phenotyping Data in Livestock

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The advent of fully automated data recording technologies and high-throughput phenotyping (HTP) systems has opened up a myriad of opportunities to advance livestock research and husbandry practices. Such technologies allow scoring large number of animals for many variables, which can be used for real-time monitoring of animal behavior and condition, and development for optimized management decisions. HTP tools include, for example, image analysis and computer vision, sensor technology for motion, sound and chemical composition, and spectroscopy. Applications span from health surveillance, precision nutrition, and control of meat and milk composition and quality. However, the application of HTP requires sophisticated statistical and computational approaches for efficient data management and appropriate data mining, as it involves large datasets with many covariates and complex relationships. In this talk we will discuss some of the challenges and opportunities of statistical analysis of such data. Some specific examples to be presented include the utilization of feeding behavior information in chickens, milk-spectra data in cattle, and image analysis and computer vision to monitor growth and body condition in pigs and cattle. HTP and big data will increasingly become an essential component of livestock research and modern farm operations, and the availability of skilled data science professionals with interest in agriculture will be fundamental for the successful use of such technologies.

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