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Data Collection and Analytics in Pastured-based Beef Production System

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Abstract

In precision livestock technologies, we are applying data acquisition using IoT tools to large-scale livestock production to collect more accurate, reliable data. By analyzing the big database using data science methods, we can find internal, hidden correlations and patterns in the data sets that provide valuable information for livestock farms. This will allow them to optimize production processes and make better economic decisions. In our research, we performed data analysis on free-kept beef cattle on sensor data. The research participated more than 100 animals and an animal has at least 4 different sensors, and every sensor measured different things from time to time. Thanks to this, a large amount of data was created in 1 year, so we can perform good data analysis. This dataset was not only it was interested in data analysis perspective, but also for farmers participating in research. They have multiple problems/theories that can't be solved/proven without data analysis. Our group was concerned about animal behavior and the weather connection. The

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farmer noticed it maybe have some connection, however, they could not prove it from a statistical point of view. For proofing, we used several statistical techniques and AI models.

Different measured data was stored in a relation database, from which we created a local csv database. The study was performed in a python-based jupyter-notebook environment[6].

Our basic assumption was that there is a connection between the sensor on the animal and the weather. In the interest of we can work the best in the data, we make one dataset. For the inspection we started with basic static methods, however, the result was not sufficient. After that, we wanted to prove the connection with the help of the AI learning modules. Our claim is that if the AI learning model can properly learn the data set and can make correct predictions, then a connection can be found between the data. Back checking was done by using ROC Curve and Confusion matrix. We looked at whether a trained model is appropriate if a ROC Curve AUC (Area under the ROC Curve) value was greater than 0.9 or less than 0.1.

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