

Improved Detection Method of Estrus Behaviors in Kiko Goats Using YOLOv8n Object Detection

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Observing reproductive behavioral patterns is a critical tool in assessing animal health status among a variety of agricultural applications. Numerous reports indicate time and labor were the two limiting factors in performing observational studies among various farm animal species. Apart from these factors, using human observation-based data is very subjective and may yield variation in results. This approach can increase inaccurate information and potential missteps in the decision-making process. Additionally, collecting data using human observation is very limiting when working on a large sample size. These collective challenges warrant the need to adopt artificial intelligence. In recent years, numerous studies used machine learning models to detect reproductive behavioral patterns in cattle, pigs, and companion animals. Despite the progress, adopting machine learning tools to detect reproductive behavior, particularly estrus, in goats remained underserved. To improve traditional detection methods, our study proposes a novel approach for goat estrus detection by using the You Only Look Once Version 8 (YOLOv8) machine learning model. Prior to model development, an ethogram was established to ascertain distinct estrus behaviors in individually housed Kiko goats. The ethogram was later used to determine tail wagging as a behavioral pattern of interest. Based on the performance metrics, results from our training model indicate promising results as the precision, recall, F1 value and AP50 was above 95%. Our research findings can be instrumental in improving livestock production by increasing labor efficiency and promoting early detection of anomalous estrus behaviors.