Calculation of an appropriate sample interval for scan sampling in dairy goat welfare research

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We aimed to develop a welfare protocol that can be easily applied by dairy goat farmers to evaluate and increase on-farm welfare, including a behavioural assessment by instantaneous scan sampling in a part of the herd. In order to obtain representative behavioural samples, an adequate sampling interval is needed. Appropriate intervals between two succeeding scans should not be too long to avoid wasting time and inaccurate results. On the other hand, time intervals should not be too short to avoid reduced observers' alertness and reliability and to avoid dependence between successive data-points.

Based on Engel (Behav. Proc. 38: 11, 1996), fifteen goats were randomly selected in one farm. For 75 focals of 900 seconds with continuous scoring (on average each goat was scanned 5 times), a data entry was made every second on locomotor and ingestive behaviour states, consumed food type, environment manipulation and positive social behaviour. From this protocol several instantaneous pseudo-protocols were derived, each one with a longer sample interval than its predecessor. Spearman rank correlations were calculated to measure the association between the relative frequency of the behavioural pattern under investigation in the continuous protocol and the pseudo-protocol for all focals. The one-tailed runs test was used to determine the mean probability of sampling the behaviour statistically independent. The optimum sample interval was found by making a graph of both correlations and p-values in function of the time to decide on the ideal interval giving best association with the continuous protocol but keeping independence.

The compromise for the optimal interval of locomotion was 29 seconds, for ingestion 35 seconds, consumed food type 46 seconds, manipulation of the environment 30 seconds and positive social behaviour 21 seconds. Scan sampling every 30 seconds is a minimum to obtain an appropriate sample interval to score dairy goat activity budget.