MIGHT COWS HAVE ACCENTS? – ACOUSTIC CHARACTERIZATION OF CALVES VOCALIZATIONS FROM TWO DIFFERENT GEOGRAPHICAL LOCATIONS

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The development of artificial intelligence algorithms and monitoring technologies has led to the increased use of sensors in animal production. Animal production stakeholders have emphasized the importance of non-invasive methods that provide accurate information without compromising the physical integrity of the animals. Animal vocalizations offer an opportunity to capture data of biological relevance without animal manipulation. However, the development of machine learning (ML) algorithms, based on certain assumptions, may impact the accuracy of the measurements and the interpretation of the information obtained from sensors. Vocalizations from individuals of the same species are assumed to have similar acoustic features. However, communication is strongly influenced by the environment, and there might be differences in acoustic features among individuals of the same species and age in different geographical locations. Therefore, to test this hypothesis, two categories of calves' (Holstein, around 5 months old) vocalizations were tested, i.e., "*high* vocalization" (short duration and with an ascendant fundamental frequency (f_0) with repetitions) and "*low* vocalization" (longer and with a lower f_0), along with coughing (shorter duration and high f_0) in two dairy cattle farms in Spain (in the province of Girona and Valencia), during 4 consecutive days in a temporal transit corral at each farm. The recorded vocalizations and cough were analyzed for f_0, repetitions, duration, and other spectral parameters by the Audacity® software. In total 3,921 vocalizations and 2,351 coughing events were detected. Statistical analyses were performed with a Npar1way model. Differences were observed between the two farms on the vocalization spectral parameters (bandwidth, centroid, and roll-off, P<0.05), duration (Mean±SD; *high:* 1.73±0.003 *vs.* 1.43±0.013 sec; *low:* 1.70±0.004 *vs.* 1.38±0.002 sec.; P<0.05) and f_0 (*high:* 239.27±0.757 *vs.* 287.61±2.712 Hz.; *low:* 157.59±1.219 *vs.* 265.64±0.672 Hz.; respectively P<0.05). Likewise, coughing spectral parameters (bandwidth, centroid, flatness, and roll-off, P<0.05), duration (0.58±0.001 *vs.* 0.55±0.001 sec., P<0.05), and f0 (133.49±2.155 *vs.* 300.46±2.754 Hz., respectively; P<0.05) were also different between farms. Recorded campaigns were conducted in different facilities and environmental conditions, which may affect the detection of sounds. This study reveals that designing ML algorithms for monitoring animal sounds should account for differences in the acoustic variability of farms/geographical locations to increase measurement accuracy.