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Book of Abstracts of the 74th Annual Meeting of the European Federation of Animal Science

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Lyon, France, 26 August – 1 September, 2023

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T. Kriszt[1], O. Benoit[2], G. Besche[2], J.D. Guyonneau[2], E. González-García[1] and J.B. Menassol[1]
[1]SELMET, L'Institut Agro Montpellier, CIRAD, INRAE, Univ Montpellier, 34000, Montpellier, France, [2]SELMET, INRAE, CIRAD, L'Institut Agro Montpellier, Univ Montpellier, 13300, Salon-de-Provence, France;
theo.kriszt@supagro.fr

In remote and mountainous areas, the heterogenous and often low quality of the mobile network limits the potential for the introduction of digital technologies requiring connected services for the shepherds or digital tools to monitor livestock movements and activities. Consequently, few digital solutions exist despite numerous possible applications associated for instance with real-time monitoring of the animals (recovery of animals, predator alerts, etc.). As an alternative, we tested the deployment of a LoRa network in the French Alps during the summer period when animals are grazing in altitude. The test area consisted in the summer pasture (from June to September) for one flock (Institut Agro Domaine du Merle) of roughly 1000 sheep guarded by one shepherd and covering 5.77 km2 (2,109 and 1,505 m of highest and lowest altitudes, respectively). Two LoRa gateways were deployed on pre-determined sites at an altitude of 2,049 and 2,006 meters for GATE-1 and GATE-2 respectively, using the Longley Rice Irregular Terrain Model (ITM) to predict radio coverage given the existing mobile network quality. Each gateway was fitted on a mast of up to 16 metres in height and was powered by a battery and a solar panel to meet the energy requirements for the whole monitoring period. LoRa connectivity was tested based on a virtual grid of 400 m squares. At each vertex (n=57), GNSS modules designed to be embarked on animals were used to transmit their current position through LoRa. Data on network connectivity showed that both GATE-1 and GATE-2 provided a coverage in accordance with the ITM simulation. In our conditions, LoRa network proved to be resilient to highly uneven terrain and showed overall great performances. The coverage simulation allowed to accurately plan the deployment of the gateways and prevented unnecessary on-site efforts. In order to ensure connectivity for animal and human applications at reduced costs, since one gateway can relay on the internet the communications from a large number of low-cost devices, the LoRa network proves to be a good alternative.

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