HARNESSING PRECISION LIVESTOCK FARMING TECHNOLOGY FOR MONITORING RUMINANTS IN ZOOLOGICAL SETTINGS

Jennifer L D'Amato-Anderson, MS*, Jordyn Ellorin, MS, and Andrea Fidgett, MSc, PhD

Wildlife Nutrition, San Diego Zoo Wildlife Alliance, San Diego, CA 92112, USA.

Abstract

Precision livestock farming technology specifically related to animal health care monitoring and animal tracking could be leveraged for zoological applications. Example technologies include ear tags with sensors such as accelerometers (e.g. Smartbow, Zoetis; CowManager, CowManager BV, NL; Sense Flex, Allflex, USA) and rumen bolus technology (e.g. eBolus, eCow, UK; Smart Rumen Bolus, Moonsyt, HU; Roland *et al*., 2018; Reynolds *et al.,* 2019; Caja *et al*., 2020; Pereira *et al*., 2020; Stygar *et al*., 2021). Ear tag sensors provide information on activity, real-time location, feeding behavior, grazing, and rumination (Roland *et al*., 2018; Pereira *et al*., 2020). Rumen boluses provide information on temperature and rumen pH (Stygar *et al.,* 2021). Advantages of using these technologies include automatic and real-time monitoring allowing for early detection of concerns. For example, a decrease in intake and rumination has been associated with metabolic disorders (Reynolds *et al.,* 2019). Disadvantages include limited validation of available technologies with most validation studies focused on dairy cattle, inappropriate bolus size for smaller ruminants, limited lifespan of bolus function, and investment in software. Rumination data from ear tag sensors is also less well correlated with visual observations (Reynolds *et al.,* 2019).

A potential case study for use of precision livestock farming technology in zoos centers on habitat space use and feeding behavior. The San Diego Zoo Safari Park is characterized by large, field-type mixed species habitats ranging from 25 to 65 acres which present challenges in understanding habitat space use and feeding behavior. Wildlife in these habitats are routinely ear-tagged, so adding an ear tag accelerometer sensor may be possible. The data generated from this practice would be used to improve feeding practices, habitat management, and overall wellbeing of wildlife at the Safari Park.

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