SmartCow: A project aimed at improving phenotyping capacity across cattle research infrastructures in europe.

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The future sustainability of cattle production will require improved resource use efficiency, reduced GHG emissions, and improved animal health and welfare. Facing this challenge needs far more complex animal traits than previously and they need to be assessed under a range of conditions. For example, the concepts of feed efficiency, robustness and sensitivity to health disorders are more difficult to include in selection indices than simple productivity traits. It is now time to look for means to investigate complex animal traits using smart technologies and rapid analytical methods in a standardised way applied in many contexts. At the same time, the European Strategy Forum on Research Infrastructures (ESFRI) roadmap clearly identified the need for improved coordination, harmonisation and access to European research infrastructures (RIs) on farm animals. The SmartCow project (www.smartcow.eu) answering the call H2020-INFRAIA2016-2017 was selected by the European Commission for 4 years funding starting from 1st February 2018. Three types of activities are developed to increase the phenotyping capabilities of the cattle European sector. Networking activities will create, thanks to an inventory and an interactive map, a unique portal to key European cattle RIs. The project will ensure that existing guidelines are adopted [e.g., the ICAR Guidelines for Bovine Functional Traits (section 7) are cited in distinct guidelines generated by the Networking activities]. When no international standard exists (e.g. feed efficiency, digestive, behavioural traits…), the project works towards the use of unified measurement methods through common standards and guidelines. The development of the cattle ontology of traits (ATOL and EOL; www.atol-ontology.com) through SmartCow will also be an important step to unify research methodologies and link definition of traits with standardized methods. A cloud-based database platform developed by Agrimetrics using web semantic will ensure integration, sharing and interoperability of data generated by the project leading to an open European database on cattle traits and phenotypes. Joint research activities will generate innovations for the research community on cattle towards the use of less-invasive methods and

high-throughput phenotyping. Refining in vivo methods to evaluate feed efficiency and emissions will generate innovations in experimental design and planning for more accuracy. The development of new biomarkers (proxies) that can be easily measured in milk, faeces, urine, or blood through rapid analytical methods (NIRS) will bring new phenotyping capacities. The development of tools to generate new and improved information from animal sensors and other routinely collected data (e.g. prediction of individual cow status in terms of health and welfare) will also enable a more efficient phenotyping and genetic selection of cattle. Finally, the project organizes transnational access to major RIs: INRA in France, Scotland's Rural College and University of Reading in the UK, Wageningen University and WUR/DLO in the Netherlands, FBN-Leibniz in Germany, Teagasc in Ireland, Aarhus University in Denmark and IRTA in Spain. It provides access to around 2500 dairy and 1000 beef cattle and facilitate up to 30 research projects to be financed by the SmartCow project after selection through specific calls. Eleven projects have already been selected after the first call.