

## UREAD – University of Reading

### Centre for Dairy Research (CEDAR)

<b>Research topics:</b>	<p>Globally recognized Agriculture and Food research at URead includes Animal, Dairy and Food Chain Science Group research at the Centre for Dairy Research (CEDAR), where facilities and expertise enable applied and strategic research on effects of nutrition on milk and meat composition, nitrogen (N) and energy balance, rumen function, digestion, methane emission, metabolism in sheep and cattle, and the fate of excreted N in farming systems. Facilities include metabolism stalls, open-circuit respiration chambers, surgical facilities, and computerized feeding stations for individually feeding over 200 cattle.</p> <p><u>Representative publications:</u></p> <ul style="list-style-type: none"><li>• Influence of ruminal methane on digesta retention and digestive physiology in non-lactating dairy cattle (2016). Dittmann, M.T., Hammond, K.J., Kirton, P., Humphries, D.J., Crompton, L.A., Ortmann, S., Misselbrook, T.H., Südekum, K.-H., Schwarm, A., Kreuzer, M., Reynolds, C.K., Clauss, M. British Journal of Nutrition, 116, 763-773.</li><li>• Effects of diet forage source and neutral-detergent fiber content on milk production of dairy cattle and methane emission determined using GreenFeed and respiration chamber techniques (2016). Hammond, K. J, Jones, A. K., Humphries, D. J., Crompton, L. A., Reynolds, C. K. Journal of Dairy Science, 99, 7904-7917.</li><li>• The inclusion of diverse forage species in the diet of growing dairy heifers: impacts on animal productivity and methane emissions (2014). Hammond, K. J., Humphries, D. J., Westbury, D.B., Thompson, A., Crompton, L. A., Kirton, P., Green, C., Reynolds, C. K. Agriculture, Ecosystems and Environment, 197, 88-95.</li></ul>
<b>Activities and services currently offered by the infrastructure/installation:</b>	<p>The infrastructure includes expertise and state of the art facilities for a variety of experimental techniques. Technical staff and supporting farm staff are highly skilled in their support of research projects. The CEDAR installations are equipped to measure animal performance (milk production and composition, live weight, rate of growth, feed conversion rate and body condition score) with individual intakes via electronic gates. The site is certificated for animal experimentation by the UK Home Office and research projects conducted are approved by an Animal Welfare and Ethical Review Body (AWERB). Milking is either through a 50-point rotary parlour, a 4x4 parlour used for research projects only, or within tie stalls or respiration chambers, facilities which support faecal and urine collection, and gaseous exchange</p>

	<p>measurements, including methane emission. Research can be conducted on up to 200 lactating dairy cows and 48 growing, dry or transition cows with supporting tie stalls (8) and respiration chambers (4) allowing appropriate restraint for detailed measurements. Surgical facilities are available supporting rumen fistulated dairy cattle for studies of rumen function and <i>in sacco</i> degradability of feeds. Tie stalls allow the measurement of total tract diet nutrient digestion with full urine collection. CEDAR routinely hosts visits from visiting farmer and industry groups and students from the UK and overseas and has extensive national and international research collaborations funded by UK Government, Research Councils, and multinational companies.</p>
<p><b>Description of the access to be provided under SmartCow TNA calls:</b></p>	<p><u>Modality of access:</u> The unit of access is defined as one cow.week. One typical access for a research project consists of 64 units of metabolism unit access (e.g. a 4x4 Latin square with 4 cows and 4 week periods) for rumen function or digestion trials. One typical access covers discussion and development of research protocols, the use of the facility, animals and basic maintenance (milking &amp; feeding) including measurements of dry matter intake and milk production.</p> <p><u>Support offered:</u> The CEDAR team who currently provide support to external users comprises 1 Research Manager, 1 Research Coordinator, 4 specialist technical staff, 4 animal support technicians and 1 support engineer. Support will be given for animal handling, feeding, milking, fertility and health monitoring including live weight, body condition score and motility. Technicians will assist with animal sampling procedures, sample processing and storage, and required laboratory analyses. Technical services in support of the conduct of Home Office regulated procedures are available. Support is available for experimental protocol development, data collection, management and reporting of results. The data collected will respect the SmartCow data management plan to allow their integration into the cloud-based database (WP3-NA3). Offices and meeting rooms with internet connection are also available and assistance with finding short-term accommodation can be provided.</p>
<p><b>Animal types, diets, housing and experimental conditions that can be worked on in this infrastructure/installation:</b></p>	<p>The facility includes a commercial farm milking 560 Holstein dairy cows and calving year-round, with milk sales of &gt;10,400 litres milk per cow annually. Cows are housed all year using sand bedded cubicles or straw bedded yards except from April to December when dry or lower yielding cows are grazed if grass growth is sufficient. The farm covers an area of 760 Ha including arable cropping, permanent pasture (60Ha), low input pasture (60Ha), Italian ryegrass (60Ha) and forage maize (130Ha). Alternative cropping is established for research</p>

	<p>purposes and recent examples include research with lucerne, clover, and biodiverse 'herbal' pastures. The herd is closed with all young-stock being reared on site. Research is performed on cattle from birth to weaning, growing cattle, lactating heifers and multiparous dairy cows and can be based on either housed or grazing system platforms. Cattle are typically fed maize- and grass-silage based total mixed rations.</p> <p>Metabolism facilities are available for characterization of total tract digestion of feed, including urinary excretion, and rumen function, including rumen sampling and <i>in sacco</i> degradability, using lactating or dry Holstein cows or growing Holstein or Holstein x Angus cattle.</p>
<p><b>Travel and subsistence costs:</b></p>	<p>A budget of up to €2,400 is available for travel and subsistence costs for up to 2 people from successful applicants to visit CEDAR and the University of Reading to plan and participate in the work (reimbursements are up to €300 for travel and €100 daily for subsistence).</p>
<p><b>Infrastructure/installation ethical rules:</b></p>	<p>All research conducted involving the use of animals must where required be licensed by the Home Office under the UK Animals (Scientific Procedures) Act (1986), including appropriate Project and Personal licenses as needed. Planning of experiments will require at least 4 months and more time will be needed if a new Home Office license is required.</p>