

## Summary of research funded June 2022

Four new research awards grants totalling £60,000 in the latest round of funding from the Foundation. Summaries of the research is given below.

### **Maximising protein yield from home-grown legume-based crop-mixtures**

#### **James Hutton Research Institute**

High-protein legume grain import dependency has placed Scottish organic producers in an unattractive position financially, and environmentally. High import prices and price-volatility can be avoided by producing legume grains 'at home'. This approach also offers environmental benefits, as legume crop residues present a complex organic provision to help realise more holistic crop rotations. The potential is due to 'biological nitrogen fixation', a process whereby atmospheric nitrogen is 'fixed' into biologically useful forms. This is a function of the symbiosis between legumes and soil bacteria termed 'rhizobia'. The benefits of high protein grain production are therefore allied to enriching crop residues which remain in-field. Here, protein yield, yield qualities, and soil-enrichment potential will be maximised using novel grain legume and cereal 'crop mixtures', i.e., cultivating multiple crop species in the same field at the same time. The project also tests the efficacy of elite-rhizobia to further optimise the protein yield potential

### **The improvement of health and performance of dairy-bred calves on a calf rearing unit through strategic grouping**

#### **SRUC**

The dairy-beef sector has increased markedly in the UK due to the use of sexed dairy semen as not all cows within the dairy herd will be needed to breed replacement dairy heifer calves. The majority of these dairy-bred calves will enter the dairy-beef production cycle by being sold onto calf rearing units at a young age. At such rearing units, these calves will enter an unfamiliar environment and potentially be mixed with other calves from other farms. These all present a challenge to such calves. The proposed research aims to investigate the effects of

grouping dairy-bred calves on arrival to the rearing unit based on health status on their subsequent health and performance

## **The effect of single and paired housing on dairy calf health and welfare**

### **University of Edinburgh**

There have been a number of welfare concerns raised about the individual rearing of dairy calves in early life, such that the practice is now not allowed for many Scottish dairy farmers under a number of supermarket-aligned contracts. Using a non-randomised control trial, this project will examine the effects of individual versus pair-rearing of dairy calves on calf productivity (assessed via daily liveweight gain), health (morbidity and mortality) and welfare assessments (assessed using a number of behavioural measures including latency to feed, novel object test and Qualitative Behavioural Assessment (QBA) as well as salivary cortisol measurements). The hypothesis is that pair-rearing dairy heifer calves from birth to 2-3 weeks of age compared to individual rearing will provide long-term benefits in calf performance, health and welfare.

## **Investigating the impact of early life housing on play behaviour in dairy calves.**

### **University of Glasgow**

Animal welfare is an increasingly important subject that is gaining interest not only from veterinarians and scientists, but also from consumers. The public drive for higher welfare standards has increased the need for research to better understand the needs and nature of animals. Dairy calves are often housed individually to minimise spread of disease and allow for greater monitoring of feed intake. However, isolation can be stressful for calves and may negatively impact welfare through limiting natural social behaviours.

Welfare assessment has typically focused on the elimination of negative welfare challenges (e.g. disease), whereas the concept of Positive Animal Welfare (PAW) is a more recently established approach to welfare assessment that focuses on promoting positive experiences as an indicator of good welfare. Alongside traditional parameters such as health and production outcomes, behaviour can be used as a measurement of welfare. Play behaviour is observed in the absence of environmental adversity, and as such reflects a good welfare state. It has been shown that high levels of play can be directly linked to optimal

animal welfare (4) and that play is initiated when an animal is adequately fed and healthy. Assessment of play behaviour can therefore provide veterinarians and livestock keepers an indicator of positive health, wellbeing and welfare.

It is reported that increased space allowance and companionship in group housing is associated with increased play behaviour in older calves . However, play behaviour in calves in early life has not been widely studied. This may be attributed to the fact that play behaviour can be limited and sporadic in neonates, meaning observational methods of recording behaviour can be time consuming, labour intensive, and impractical for studies of long duration. The introduction of motion sensor technology has allowed for detailed analysis of animal behaviours such as lying, playing, and feeding in a much less time-consuming manner. Accelerometers have been validated for detecting play behaviour in newborn ( $\leq 48$  h old) dairy calves in a group housing system, but the use of accelerometers to compare the impact of early life housing on play behaviour has not yet been studied.

It is reported that early life experiences such as calf nutrition, health and environment can impact future performance in dairy cattle. Calves that are socialised early in life show increased play behaviour and enhanced weight gain at future points in the pre-weaning period. The impact of housing, socialisation, and play behaviour on future performance of dairy cattle has not been investigated. Therefore, this project aims to use accelerometers to investigate the impact of early life housing on calf play behaviour, and to assess the effect this may have on future health, performance and behaviour. The findings of this research will show the benefits of collecting sensor data to measure animal behaviour and the value such data can have in indicating health and welfare. The results will contribute evidence to the debate on calf housing systems and will aid veterinarians and animal health advisors when discussing housing and husbandry practices on farm.