Hormonal treatment for cows could reduce global warming

June 11 2015, by Lindsay Brooke

New research carried out by The University of Nottingham suggests targeted use of hormone treatments could make the dairy industry more efficient and sustainable in addition to cutting greenhouse gas emissions.

The research; 'Use of stochastic simulation to evaluate the reduction in methane emissions and improvement in reproductive efficiency from routine hormonal interventions in dairy herds'; published in the academic journal *PLOS ONE* was led by Dr Simon Archer, from the School of Veterinary Medicine and Sciences.

Dr Archer, a Research Fellow in Veterinary Epidemiology, said: "Routine hormone treatments could improve efficiency by getting more cows pregnant sooner. This is better for the environment as for every litre of milk produced; fewer animals would be needed, which generates

less waste. This applies for any breed of cow and to the majority of farms, except those that are already exceptionally well managed."

By 2050 it is predicted that growth in the size and wealth of human populations worldwide will lead to an unprecedented demand for foods of animal origin. Limitations on natural resources imply that the increase in agricultural productivity needed to meet this demand must be environmentally sustainable. Routine hormone treatments in dairy cows to aid reproduction could meet these objectives but this practice has raised ethical concerns. It is therefore important such use can be justified on individual farms.

Through a process of fermentation, ruminants like cattle and sheep are able to digest plant material that the human gut cannot break down. These animals make an important contribution to food security by turning human-indigestible plant material into nutritious, protein rich food. However the process of fermentation releases methane, a greenhouse gas with at least 25 times the global warming potential of carbon dioxide.

To achieve economies of scale and remain viable businesses, many dairy herds have become larger in recent years, with less people looking after more cows. In order to produce milk, cows must give birth to a calf. Breeding is typically by artificial insemination, which requires that farm workers first detect cows that are in heat. This 'heat detection' stage is notoriously inefficient, and an alternative is to use hormone treatments to enable breeding at predictable times.

Dr Archer and his team carried out a computer simulation of individual cows from 10,000 dairy herds (more than in the UK); to compare traditional reproductive management with what could happen if specific routine hormone treatment programmes were adopted for a short time when cows first become eligible to breed.

Dr Archer said: "The results varied between herds, but for an 'average' UK herd, there would be a reduction in methane emissions equivalent to the global warming potential of two cars, a family home, or 21 barrels of oil. The farmer would also save at least £50 per cow each year in production costs." It is concluded that the routine hormonal treatments tested would be financially viable on many farms, bringing benefits to society through reducing global warming and ensuring the continued availability of affordable milk.

More information: "Use of Stochastic Simulation to Evaluate the Reduction in Methane Emissions and Improvement in Reproductive Efficiency from Routine Hormonal Interventions in Dairy Herds." *PLoS ONE* 10(6): e0127846. DOI: 10.1371/journal.pone.0127846

Provided by University of Nottingham