DNA study of cow stomachs could aid meat and dairy production

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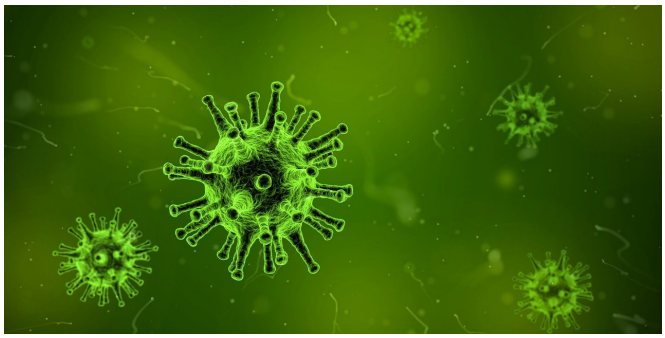

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Meat and milk production from cattle could one day be boosted, thanks to analysis of microbes in cows' stomachs.

The study paves the way for research to understand which types of microbe - such as bacteria - are best at helping cattle to extract energy from their food, experts say.

It also identifies enzymes that are specialised for breaking down plant material, which could help in the quest to develop new biofuels.

Researchers led by the University of Edinburgh's Roslin Institute and Scotland's Rural College (SRUC) focused on microbes found in a cow's rumen - the first of its four stomachs.

The rumen is home to diverse strains of microorganisms, such as bacteria, archaea and fungi, which help the animal to extract energy and nutrients from its food.

The team used an advanced technique called metagenomics, which involves analysing the genetic composition all of the microbes that exist within an organism, in this case a cow.

They studied samples of rumen gut contents from 43 cows and identified 913 diverse strains of microbes living in the rumen.

Most of the microbes uncovered have never been seen before and may have potential uses in the biofuels and biotechnology industries.

By analysing their genetic information, the team pinpointed previously unknown enzymes that can extract energy and nutrition from plant material.

Beef and dairy cattle, and other milk-producing ruminants, provide food and nutrition to billions of people worldwide.

Understanding how these animals convert plant-based diets into energy will be vital for securing the future of the world's food supplies, experts say.

The research, published in the journal *Nature Communications*, was carried out in collaboration with experts at The Rowett Institute at the University of Aberdeen.

The Roslin Institute receives strategic funding from the Biotechnology and Biological Sciences Research Council.

Professor Mick Watson, of the University of Edinburgh's Roslin Institute, said: "This has been a truly fascinating study, and really we are only beginning to understand what these microbes do. The fact most of them were very different to microbes that have already been discovered surprised us, so we just can't wait to study them further. If we can improve the efficiency of digestion in cows and other ruminants, we may be able to produce more food for people whilst using fewer resources. This is a key aim of improving global food security."

Professor Rainer Roehe from SRUC said: "The newly identified microbial species in the rumen of

beef cattle will greatly improve our understanding of how the rumen microbial ecosystem works. Using breeding and nutritional interventions, we will be able to use this information to help improve cattle health and performance throughout the world."

More information: Robert D. Stewart et al, Assembly of 913 microbial genomes from metagenomic sequencing of the cow rumen, *Nature Communications* (2018). DOI: 10.1038/s41467-018-03317-6

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