

Cows and producers are heading for 20,000 litres

20,000-litre cows —

The Royal Agricultural University's Toby Mottram believes that sensor-based technologies, which detect problems before they start, will play a major part in managing long-life cows that produce 20,000 litres.

text **Karen Wright**

Improved milk yields in British dairy herds will arise from more proactive cow management, improved nutrition and better disease detection.” So said Toby Mottram at his inaugural lecture in October. He supported his argument for higher yields with environmental rationale. “Higher yields would mean fewer cows. We would need one million fewer cows to produce the same amount of milk as we do today.

“This would reduce methane emissions by 30% and, with improved longevity, the demand for heifers could be reduced by 75%. Valuable land would be released allowing for more extensive systems.”

Professor Mottram added that he could see consumer and retailer demands leading to legislation that specified that all cows must spend some time outdoors grazing.

Delving back 60 years, the then Principal of the Royal Agricultural College Bobby Boutflour lectured on achieving the 2,000 gallon (9,000 litre) cow. At a time when average yields were 400 gallons, the RAC Steadings herd of 22 cows of mixed breeding were paving the way to these

higher yields. Milked three times a day, fed to yield by hand and housed in a byre, they were averaging 1,987 gallons (9,021 litres), land stayed in the herd for between seven and eight lactations and gave their highest yields in their fifth to seventh lactations.

Next level

“Sixty years on, and with a great deal of ‘genetic’ progress under our belts, and this herd would still be in the UK’s top 50% for production,” said Professor Mottram.

He puts this early success down to management techniques. He sees the same attention to detail taking today’s cows to the next level. But this step forward will not be without agricultural technology – agritech – and under his Professorship’s remit he will endeavor to train the next generation of technologists.



Toby Mottram: “Higher yields would mean fewer cows”



by using new technology and improving management

science fact or fiction?



Professor Mottram has a good track record on which to base his future work. He established the rumen pH sensor that is now sold worldwide by eCow. A bolus placed in the cow's rumen detects changes in pH and through diet changes this can be rectified before production problems occur. The sensor has not only been highly successful in West Country forage based systems but also in more controlled housed systems, where it can pick up problems and help in the detection of sub clinical problems.

He was also instrumental in using wireless technology in heat detection systems where a motion detector can pick up movement in 3D with results relayed to a PC.

Missed opportunities

"Looking ahead, the three research priorities that will contribute to higher yielding and longer living cows are management, housing and silage," he said. He emphasised the need to look at lifetime yields – not annual production. "We must focus on high lifetime yields from long living and healthy cows."

In terms of technology, milk progesterone analysis, lameness monitors, calving detection devices and, of course, robotic milkers will all play a part in improving management and milk yields. New sensors within the rumen bolus will allow nitrogen balance and fatty acid levels to be monitored.

"There are missed opportunities – why aren't cows reaching their potential? We have cows with much bigger engines but we're not using them."

And while genetics has contributed to today's cows, he feels that breeding companies have concentrated on breeding cows to cope with management limitations. "Instead, we should be solving the root cause of the problem.

"For example, why do we make our cows walk on concrete? It hurts their feet and any slight lameness problem is highlighted. In contrast, I see cows on rubber mats galloping around. But research into concrete isn't fashionable and hasn't attracted funding so development in flooring has been overlooked."

Cow comfort

He sees the need for some work to be done here in improving flooring material for cow housing. "Making things comfortable underfoot and our cows will inevitably perform better. That's not difficult to work out.

"Improved housing means keeping cows in family groups, providing comfortable beds in well ventilated buildings, and providing soft walking surfaces."

Professor Mottram was involved in some of the early

movement detectors for lameness, but he can now see a far simpler system that uses 'face' recognition on smart phones. He is seeking funds to develop the algorithms.

"All we need to do is time how long it takes a cow to move between two points in the yard – the system will recognise the cow and record the time taken. If she's got a problem she will be slower due to lameness – even if this isn't obvious to the naked eye. It's at this point that she needs treating before there's a real problem that affects her fertility and yield. Once we have the software, we should be able to build up a picture on the system and we will be able to monitor lameness automatically."

There's scope, too, to improve silage analysis through improved technology. "Forage quality changes as we work through the clamp," he added. "It would help to know silage quality on a daily basis. We need to analyse silage at the front of the clamp and then feeding can be adjusted according to the quality."

Welfare standards

Dismissing claims that high production cows suffer short and brutal lives, Professor Mottram argued that higher yields mean fewer cows and with fewer cows to manage their welfare can improve. "High production has got to mean higher welfare standards and herd management has to be more professional," he said.

An added benefit of fewer cows is the reduction in pollution and the increased efficiency of dairy production. "The margin over feed could potentially increase from around £1,000 per cow to £5,500 per cow, given the correct management and technology tools."

So Professor Mottram's vision for 2053? "For welfare reasons cows will spend between two and five months outside and this could well be legislated for. We need older cows to teach heifers how to graze.

"Buildings should be improved to better replicate outdoor conditions – flooring and ventilation improvements are needed and cows should live in family groups.

"Robots should do the menial work to overcome the shortage of skilled herdsmen and sensors, that are linked to third parties such as vets and buyers, will be used.

"Practical appraisals of the knowledge of forages should help improve the quality of feed on offer and help to target 50% dry matters.

"And, of course, the goal is seeing more cows achieve yields of 20,000 litres with an average lifespan of 12 years," adds Professor Mottram. |