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Guest Editorial

The benefits of growth monitoring in dairy heifers

The Veterinary Journal has recently published a paper by Kat Bazeley from Synergy Farm Health together with her co-workers Professor David Barrett and Dr Kristen Reyher (University of Bristol) and Paul Williams (MSD Animal Health) based on the results of monitoring heifer growth on 20 dairy farms in South West England (Bazeley et al., 2015). Their paper provides a good example of the practical application on farm of findings originally obtained from research studies.

Starting in 2001, Defra together with DairyCo (now AHDB Dairy) co-funded two longitudinal studies at the Royal Veterinary College (RVC), London. The first examined in detail the development of 122 Holstein Friesian calves born on a single farm whereas the second involved the recruitment of cohorts of newborn heifer calves from 19 dairy farms, starting with 506 animals in total. In both cases the individual animals were subsequently monitored until they were either culled or reached 5 years of age. The RVC work was based on an increasing realisation that some of the many problems with health and fertility experienced by adult dairy cows are likely to be caused much earlier in their lives. This view was initially promoted by Professor David Barker, a physician and epidemiologist working at the University of Southampton, UK. Through meticulous research based on analysis of medical records he transformed thinking about the causes of common human disorders such as diabetes and cardiovascular disease by developing his 'fetal programming hypothesis'. Although the individual's genotype and adult lifestyle are also clearly influential, Professor Barker proposed that the origins of chronic diseases of later life often lie in the environment experienced by the fetus and infant, in particular their pre- and early post-natal nutrition and exposure to infection after birth. This early environment in turn 'programmes' the body's metabolism and growth, so contributing to subsequent pathologies. He set out these ideas in a series of books, starting with "Mothers, Babies and Disease in Later Life", first published in 1994 (Barker, 1994).

The two RVC studies provided support that the same issues are relevant to cows. The first found that the birth weights of newborn calves are influenced by the age and milk yield of the dam during her pregnancy. Low birth weight calves averaging 32 ± 0.5 kg were more likely to have had older dams (lactations 3-6) with higher peak yields (>42 kg/day) (Swali and

Wathes, 2006). This is, perhaps, not surprising as milk yields rise over the first three lactations and the nutrient requirements for milk production will compete with those of the developing calf. The second, more extensive, study found that there were huge variations in the early growth rates of calves on UK farms which were linked to mortality rates, fertility as heifers and subsequent milk production and longevity of the adult cow (Brickell et al. 2009; Cooke et al. 2013). At the same time work from other countries also emphasized the importance of early calf nutrition and disease exposure (in particular severe respiratory disease) to lifetime performance (e.g. Bach, 2011; Heinrichs and Heinrichs 2011). These problems of young heifers could be prevented by good management, but many studies have reported that few dairy farmers keep good records of either growth rates or disease incidence in their dairy replacements. This basic information is essential for developing an appropriate calf rearing strategy on farm.

Kat Bazeley as a practicing veterinarian became interested in this research and took steps to implement it by setting up a service which sent technicians onto commercial farms with accurate weighing equipment so that growth monitoring and associated advice could be provided. They collected over 8,000 weights over a 4 year period. Their findings are of key importance as they support the initial research. Birth weights were very variable with a range of 24-55 kg and birth weight had a significant positive correlation with subsequent weight measurements (Bazeley et al. 2015). This suggests that animals cannot totally compensate postnatally for restricted growth *in utero*. Calves in their first 30 d of life grew on average at only 0.12 kg/d, even though animals of this age have a high feed conversion rate so can grow very efficiently if provided with sufficient nutrients. In order to calve at the recommended age of around 24 months, heifers need to reach a desired target weight for bulling of 374 kg by 420 days of age. In the lower performing herds monitored in the Bazeley study, the average growth rate from birth to first calving was only 0.58 kg/d and fewer than 10% of heifers in these herds reached the target bulling weight on time.

These results confirm that there is a valid concern that dairy heifers on some farms are not receiving sufficient feed to fulfill their growth potential. Evidence from other studies suggests that this both increases their likelihood of contracting disease and delays their age at first calving and subsequent health and longevity. On the plus side, the study also shows that veterinary practices can justifiably take a more proactive role in future by working with their dairy clients to put in place sound plans to improve their heifer rearing systems. The money spent by farmers to improve early growth rates and minimize disease through better

management practices should be recouped by a greater proportion of heifers reaching first calving at the appropriate time and subsequently becoming more profitable cows which can fulfill their genetic potential.

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