Beefing up the suckler herd

The BeefCow project, led by TEAGASC Grange, takes an all-Ireland approach to suckler herd fertility, looking at the many different factors affecting it and how it can be improved.

Reproductive efficiency is a major determinant of the profitability of beef suckler cow enterprises. The BeefCow project is a large Department of Agriculture, Food and the Marine- (DAFM) funded all-Ireland research programme tasked with examining key factors underpinning the reproductive efficiency of suckler beef herds. The project is led by Teagasc Grange, and involves partners at University College Dublin (UCD), the Irish Cattle Breeding Federation (ICBF), the Agri-Food and Biosciences Institute in Northern Ireland (AFBINI), and the *Irish Farmers Journal*. The principal elements of the project are discussed here.

Advancing puberty and breeding

The timing of puberty is critically important to successfully calving heifers at 24 months of age. Sexual development of the heifer is regulated by a complex interchange of biochemical messages between reproductive and brain tissues, which can be influenced by factors including breed and nutritional status. Thus, growth and body composition, particularly fat, can influence the timing of puberty. However, there is little information on appropriate replacement heifer rearing strategies to ensure early onset of breeding and calving at 24 months of age for beef breed types in Ireland.

To address this issue, a two-year study was conducted at Grange to examine the effect of post-weaning nutritional management for different breed types on age at puberty and subsequent pregnancy rate. In total, 320 spring-born heifers purchased at seven to eight months of age from commercial herds were used.

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The heifers were sired by either an Angus (early-maturing) or Limousin (late-maturing) bull, and were the progeny of either dairy or beef cows. They were assigned to either a high or moderate plane of nutrition over the winter period in order to achieve average target growth rates of approximately 1kg or 0.5kg per day, respectively. The heifers were subsequently bred using AI, while at pasture, over a 12-week breeding season.

Overall, dam type did not affect age at puberty or age at first breeding, but pregnancy rate following breeding for either six or 12

weeks was higher for dairy compared to suckler-bred heifers. Heifers sired by a bull of an early-maturing breed were younger at puberty and at first breeding, and had a higher pregnancy rate at six weeks compared to those sired by a bull of a late-maturing breed, but sire breed did not influence pregnancy rate following 12 weeks of breeding. While age at first breeding was advanced for heifers on a high winter feed allowance, plane of nutrition did not affect pregnancy rate following either six or 12 weeks of breeding. Currently, the influence of nutrition during the calf-rearing phase on sexual maturation in the heifer is under investigation, and target pre-breeding growth rates are being formulated for the various breed types of interest.

Increasing use of AI

Given that only 20% of calves born annually in Irish suckler beef herds are bred using AI, there is increased interest in developing oestrous or heat synchronisation protocols that facilitate timed AI (TAI). This eliminates the requirement for heat detection, the major issue restricting the widespread usage of AI.

To this end, on-farm heat synchronisation studies were conducted by Teagasc, AFBINI and UCD in conjunction with Ceva Animal Health, and involved 74 spring- or autumn-calving suckler herds (2,205 cows). Three different synchronisation protocols were compared and all cows were subjected to a single TAI. Pregnancy rates ranged from 50-70% in these studies, with an average pregnancy rate of 55% recorded. These results were encouraging given that circa 50% of cows had not resumed normal post-partum ovarian cyclicity at the initiation of treatment. More importantly, synchronisation condensed the subsequent calving pattern such that 80% of treated cows were pregnant within the first three weeks of the breeding season (combination of TAI and repeat breedings).

Impact of pathogen and trace element status

Various endemic pathogens are frequently cited as mediators of poor fertility in beef cattle; however, there are little data available to quantify their impact on either productive and/or reproductive efficiency. To address this, almost 6,000 cows from 169 spring-calving suckler cow herds were blood sampled during the breeding season and the seroprevalence (presence of antibodies) of bovine viral diarrhoea virus (BVDV), bovine herpes virus (BHV-1), leptospirosis (*L. hardjo*) and neosporosis (*Neospora caninum*) was established.

A seroprevalence of 71, 78, 44 and 5% for leptospirosis, BVDV, infectious bovine rhinotracheitis (IBR) and neosporosis, respectively, in non-vaccinating herds was observed. Analysis of reproduction and calf performance data supplied by the ICBF showed that these pathogens had no negative impact on pregnancy rate at the end of the breeding season, subsequent calving interval, and calf mortality or liveweight performance up to 225 days. However, importantly, seroprevalence for all pathogens measured was negatively associated with the subsequent calving rate of cows diagnosed as pregnant at the end of the breeding season, suggesting a potential, though modest, negative effect on foetal mortality.

Trace elements play an important role in the health and performance of cattle and deficiencies are often suspected in cases of poor reproductive performance, though again, there are little data to substantiate this. As part of the aforementioned epidemiological study, blood samples were also analysed for selected trace elements. Preliminary findings indicate that 15, 79 and 82% of cows are below limits considered acceptable for copper, iodine and selenium, respectively. Analyses are ongoing to determine the association of these trace elements, if any, with various reproductive, health and animal performance traits.

Whole-farm bio-economic model

The multidisciplinary nature of this project provides a powerful resource to enable a holistic analysis of the many factors that can influence herd fertility. Consequently, a comprehensive whole-farm bio-economic model is being generated, in order to more accurately inform reproductive management decisions at herd level. For example, using such an approach we have shown that while overall, seropositivity for BHV-1 (causative agent for IBR) in a spring-calving suckler herd selling weanlings in autumn had a relatively modest impact on financial performance, larger herds and those not vaccinating for the disease were found to be particularly at risk. Additionally, the impact may be greater within the context of a calf to beef system. Further such studies using this model are ongoing.

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Authors

David Kenny
Principal Research Officer, Teagasc, Animal & Grassland Research and Innovation Centre, Grange, Co. Meath
Correspondence: david.kenny@teagasc.ie

Mervyn Parr
Postdoctoral Researcher, Teagasc, Animal & Grassland Research and Innovation Centre, Grange, Co. Meath

John Heslin
Research Officer, Teagasc, Animal & Grassland Research and Innovation Centre, Grange, Co. Meath

Mark McGee
Principal Research Officer, Animal & Grassland Research and Innovation Centre, Grange, Co. Meath