

## Managing Nutrition for Production and Fertility

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Nutrition is a vital component in the management of a large dairy herd, Lillico Attlee's Warwick Bastard told delegates to the 'Meeting the Challenges' seminar in Cheshire. Attended by 80 herd managers and vets responsible for 300+ cow dairy herds, it was organised by the Evidence Based Veterinary Consultancy, Cephaguard, Lillico Attlee and Farm Business Magazine

Throughout the 'dairy year' we make substantial demands on the dairy cow, asking that she produces a live calf, remains healthy during transition and beyond, delivers high yield with good components, a controlled loss of body condition and high fertility at first breeding.

It is essential to body condition score (BCS) all groups of animals (milking, dry, heifers and calves) at each herd health check and adjust rations accordingly, as herd energy status impacts milk production, DMI, reproduction and cow health. However, rapid changes in BCS can cause problems. Compared with cows with a normal BCS, those with a BCS <2.0 or that lose more than two BCS points in the first 100 days of lactation are at risk of cystic ovaries, anoestrus, fatty liver disease and spontaneous abortion. Cows with a BCS >4.0 at dry off are three times more likely to experience dystocia, retained placenta, uterine infection, cystic ovaries and abortion in their next lactation.

BCS should be added in the last 200 days in milk, not the dry period, and if cows are fat at dry off don't allow them to lose condition in the dry period. BCS close to calving and fresh cows to monitor changes and maximise DMI. Manipulating DMI can increase milk production and components, minimize negative energy balance that leads to metabolic disorders and improve reproductive performance by reaching positive energy balance earlier in lactation. Ideally, feed should be available 24 hours a day, the maximum time without feed being four hours.

It's critical to keep feed bunks clean and avoid adding fresh feed on top of old. Rations, specifically TMR, should contain 40% - 50% dry matter and water or wet brewers grains added if too dry. A rough, uncomfortable feeding surface can significantly reduce DMI and should therefore be tiled or painted with an epoxy-like resin. Each cow should have at least 1m of bunk space available, while feed refusal should be weighted and monitored using a 'shaker box', each being within +/-10%. Frequent feedings decrease fluctuations in rumen pH, stabilise the rumen environment, improve DMI and maintain fresher, more palatable feed, particularly in summer. TMR should therefore be fed at least twice daily.

Foot problems are a nutritionist's nightmare, yet infectious and non-infectious cases continue to plague the global dairy herd. Cows that cannot walk don't eat, go down in the stall and stay there. They're also reluctant to show heats, even when cycling, because it hurts to be on their feet, are more prone to reproductive problems and metabolic disorders and likely to be culled prematurely.

Whilst protein nutrition's role in reproduction is still not completely clear, the Degradable Protein System has helped to provide sufficient soluble/degradable protein to maximise rumen microbial fermentation and growth with undegraded intake protein supplying amino acids to the small intestine above microbial supply. Balancing protein types prevents excess ammonia production in the rumen that leads to elevated blood urea nitrogen (BUN), which with milk urea nitrogen causes a toxic environment around the reproductive tract. These nitrogen compounds decrease the viability of sperm cells, ovulated eggs and embryos, resulting in increased services and cows diagnosed as pregnant coming back into heat three months later. Between 60%-65% of dietary crude protein should be degradable crude protein, of which 40%-60% should be soluble crude protein, while 35%-40% of dietary protein should be degradable intake protein. Micronutrients, minerals and vitamins are also important in achieving efficient, profitable production, making it essential that all vitamins and minerals be supplemented to a good, but not toxic, level. In the milking herd, calcium should form 0.8% - 1% of the total ration, equivalent to 180 - 250g/h/d, potassium 50% of calcium level, magnesium should be balanced at 0.35% and the Ca:P ratio should be 2:1.

Two micro-minerals associated with enhanced reproductive performance are zinc and selenium. Both improve membrane integrity and positively influence udder and reproductive tract health by enhancing uterine environment and supporting increased fertility. Selenium and Vitamin E decrease the incidence of retained placenta, metritis and increase the rate of uterine involution. Vitamin E should supplement the close-up dry ration at 1000-2000 IU/day and at 1000 IU/day in an early lactation ration. Niacin, Biotin and Choline are water-soluble vitamins usually manufactured in the rumen, but in high-production animals synthesis may be inadequate and recently rumen-protected products have become available. Niacin helps with 'fat cow syndrome, Biotin aids membrane integrity at hoof level, while Choline assists smooth transitioning from the dry to the milking phase.

Retained placentas can result from a shortage of calcium causing milk fever, ketosis from energy shortage, lack of protein, deficiencies in selenium or Vitamin E levels and factors such as twins, hard/late/early calving, all of which negatively impact future fertility.

Nutrition is a key element in achieving and maintaining performance from a high output dairy herd. Demanding specialist knowledge and continual appraisal, it is one element of managing a large herd that cannot be ignored.

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