DAIRY HERD HEALTH & PRODUCTIVITY SERVICE

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Blood testing thresholds – the evidence

We are often asked about the evidence that informs the thresholds we use when interpreting metabolic profile results, particularly whether our thresholds are too "strict". Given that the DHHPS has been metabolic profiling for 45 years (before many of our vets were born!), asking whether our methods and thresholds reflect the modern dairy cow is a fair question.

Indeed metabolic profiling is as relevant today as it has ever been, and both we and others continue to publish on the subject. A recent series of three papers from Cornell University are well worth a read (Journal of Dairy Science 105:5327-5369 and 106:In press). These papers looked at the blood test results and outcomes for 1,473 Holsteins across 72 herds, and largely confirmed that the butyrate threshold we use of 1.0 mmol/l is associated with poorer outcomes in milking cows. Of course, it depends exactly which outcome you consider – be that metritis, extended calving to conception, milk yield, culling risk etc., with slight differences for each outcome. However, we can be confident that having a butyrate result over 1.0 mmol/l in early lactation is not good news for cows

The data relating to "close up" dry cow NEFA thresholds makes for sobering reading, with the authors finding an increased risk of premature culling for cows with NEFA results below our current threshold of 0.4 mmol/l in dry cows. Whilst we will not be changing our thresholds on the basis of a single study, we will be keeping a close eye on this developing evidence, as it would suggest that the NEFA thresholds used by the UK dairy industry may not be "strict" enough.

It is also of note that these studies showed that in these North American herds, feed management issues such as trough space and feeding frequency were the significant factors affecting high butyrate and NEFA values in cows. These papers are also a nice reminder of how metabolic profiling should be used by farmers, nutritionists and vets. In their analyses, the authors looked at the Positive Predictive Value (PPV) of blood butyrate and NEFA levels for predicting poor outcomes in individual cows. The PPV was below 20% for all parameters examined i.e. fewer than 1 in 5 cows with a butyrate or NEFA outwith the optimal range went on to suffer from an adverse outcome. This confirms what we have always known … metabolic profiling is a herd tool, and should not be used to predict the outcomes of any individual cow. Therefore whilst we know that it is bad news for the herd if half the early lactation cows have elevated butyrate results, it is perfectly plausible that each of the individual cows sampled will go on to have completely normal lactations. The point is that there will be plenty of other cows in the herd that will not!

Unfortunately, we have recently seen a number of disappointing blood test results, with cows particularly struggling during the transition period. With the spring flush just around the corner, the prospects for the milk price do not look good, and we anticipate more farms cutting back on purchased feed. As we look to maximize yields from forage, it is worth reminding ourselves that meticulous attention to detail is needed to achieve excellent forage intakes. Metabolic profiling is a useful tool to assess whether intakes are where they should be and to take corrective action before poorer yields, fertility and cow health show through in the herd records.

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Importance of energy for ewes in late pregnancy for colostrum production

Whilst a lot of the recently published work has focused on the importance of protein and trace elements for colostrum production, it is worth noting that general under-nutrition in late pregnancy is considered the nutrient imbalance most commonly encountered in the pregnant ewe. Dietary energy is therefore likely to be the most common limiting factor on colostrum production in sheep.

As well as containing immunoglobulins essential for the immune function of the newborn lamb, colostrum is also high in energy: ewe colostrum contains 7 – 13% fat, and provides 6 – 7 kJ of energy per ml. As well as constituting an important energy source for the newborn lamb, it will also require significant supplies of energy to produce by the ewe.

A number of studies have demonstrated a relationship between energy intake in the ewe in the last three weeks of pregnancy and colostrum production. Under-nutrition in late pregnancy will reduce the quantity of colostrum produced, and has also been shown to increase colostrum viscosity which makes it more difficult for the lamb to suckle.

In addition, an increase in nutrient intake in late pregnancy before lambing will increase progesterone clearance by the liver, which helps with the onset of milk production. Ewes with poor energy status have lower blood glucose levels, which has been shown to impair milk production. Therefore, ensuring that the ewes' energy requirements are met in late pregnancy will not only prevent conditions like twin-lamb disease, but will also enhance colostrum supply.

Ewes in late pregnancy are faced with two main problems in maintaining their energy balance. The first is that 75% of the lamb growth occurs in the last 6 weeks of pregnancy, and so the nutritional requirements of the ewe rapidly increase prior to lambing. The other problem is that the lambs, placenta and birth fluids take up large amounts of space in the ewe's abdomen, meaning that she struggles to eat enough food. This means that ewes in late pregnancy will struggle to meet their high energy demands, which can be compounded if forage quality is poor for example.

Recommendations for ensuring good colostrum quantity and quality in late pregnancy in ewes:

- Get your forages (silage or hay) analysed for nutritional content, given that these will form the basis of the prelambing diet.
- Scanning ewes and grouping according to lamb number and body condition score allows for the targeted feeding of ewes according to requirements.
- Formulate a ration for the ewes in the last 4-6 weeks of pregnancy to ensure that their energy and protein requirements are met.
- Sufficient starch (from cereal grains such as wheat and barley) or sugar (from molasses) is required in the diet to supply energy for the rumen microbes. Root crops such as turnips and fodder beet are also high in sugar, but intakes can be variable if fed outside in cold weather. The diet must be balanced for the supply of energy and protein to the rumen, as well as ensuring that the rumen is kept healthy to prevent rumen acidosis due to over-feeding of carbohydrates.
- Undertake a DHHPS metabolic profile in the last 3-4 weeks prior to the start of lambing to assess both energy status (via BOHB levels) and ERDP intakes (urea-N). This will allow sufficient time for any corrections to be made prior to the start of lambing. DHHPS results indicate that around 10% of ewes have elevated BOHB results in late pregnancy indicating that they are struggling with their energy balance, and correcting this is vital.