DAIRY HERD HEALTH & PRODUCTIVITY SERVICE

# Newsletter 2022, Q2 May 2022

## Do we feed cows too much phosphorous?

Phosphorous is a major mineral that is essential for a wide range of metabolic processes within the body – from how cells work, energy metabolism and bone formation, to the function of rumen micro-organisms.

Phosphorous (P) deficiency can occur in two main forms in cattle. The first acute form is seen in cattle around calving, with affected cattle going down (often linked with milk fever) and described as "creeper" or "crawler" cows. Other cows can develop a syndrome called periparturient haemoglobinurea, where cows develop characteristic red urine and are often sick with reduced milk yield. These acute forms are related to the sudden changes in P metabolism in the cow at the onset of lactation.

Chronic P deficiency occurs due to long-term lack of P in the diet, and is most often seen under extensive grazing conditions. The main clinical sign is anorexia, which results in a decreased feed intake and so weight loss, reduced milk production and growth. P deficiency can also affect bone growth in growing animals, resulting in conditions such as rickets.

Another "classic" sign of chronic P deficiency in cattle is depraved appetite (called pica), where cows will eat soil, stones, concrete and other materials in an attempt to consume more minerals. Such signs are often reported in low-input grazing dairy herds with minimal mineral supplementation, although it should be noted that these symptoms may also occur in other conditions such as sodium (salt) deficiency.

Historically, it was thought that chronic P deficiency resulted in poor fertility. However, current thinking is that any poor fertility was due to anorexia and weight loss, rather than a direct result of P deficiency.

Many milking cow rations feed over 0.4% P, and increasing P was previously thought to benefit cow health and fertility. However, given the cost of P minerals and the increased environmental pollution due to excretion of excess P, should we be re-evaluating feeding excess phosphorous?

Indeed, a study in North America (JDS 2000, 83, pp1052-1063) fed dairy cows a diet containing 0.38% P when housed and 0.31% P at grass over a 2 year period, and found no difference in milk yield compared to those cows fed a diet containing 0.44 - 0.48% P. Similar studies in AFBI in Northern Ireland (Animal 2010, 4, p545-571) fed dairy cows diets containing 0.36% P over four years with no harmful effects on productivity, cow health, bone density or fertility.

Although focused on milk fever prevention in transition cows, a recent study (JDS 2021, 104(11), pp11646-11659) fed dry cows a diet containing 0.22% P for the last 6 weeks of the dry period and milking cows 0.29% P for the first eight weeks of lactation, and compared this to "high" P diets (0.36% - 0.38%). There was no harmful effect of lower dietary P levels on milk production or DM intake, although cows on the low P diets had higher blood calcium levels and fewer cows had subclinical hypocalcaemia. Although this was a short-term trial around calving (and P levels should not be extrapolated for the whole lactation), it confirms previous advice that feeding dry cows diets high in P is not recommended, as it increases milk fever risk.

There is no question that P is an essential major mineral for all animals, including dairy cows. However, just because a little bit is good, does not mean that more is even better! The research evidence and recommendations from AFBI is that we could (and should) be feeding milking cows safely with 0.36 – 0.38% dietary P.

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## Avoiding bulk tank failures

Antibiotic (or inhibitory substance) bulk tank failures are every dairy farmer's nightmare. Recent analysis from Jon Massey's PhD at Bristol University (available online) of bulk tank failures recorded by NML has shown an almost halving of failures from around 0.26% of bulk tank samples in the second half of 2016, to around 0.14% in the first half of 2020. Whilst not every bulk tank failure results in a tanker failure, he estimated that despite this significant reduction in bulk failures, the UK industry spends somewhere in the region of £500,000 per month on the cost of incinerating failing tanker consignments.

At an industry level, it is interesting to note that computer models can predict bulk tank failures with astonishing accuracy using a farm's preceding bulk tank Delvotest Z-values. The Z-value is a number from -12 to +12 that represents the results of the Delvotest, with a result of over 0 indicative of the presence of inhibitory substances (i.e. antibiotics) in the milk. Whilst more work is needed to understand exactly what this means, this work has two potential implications for the industry:

- The first is that it may soon be possible to warn farms that they are at risk of an impending bulk tank failure.
- The second is that farms that suffer a bulk tank failure may potentially have increased levels of inhibitory substance (antibiotic) residues in their milk preceding a failure, even though these levels are still below threshold.

Detailed analysis of 47 bulk tank failures in a single UK producer group between 2014 and 2017 (Cattle Practice 2017, 25(3) pp248-253) identified that around half of failures involved milking cow intra-mammary tubes and a quarter involved dry cow intra-mammary tubes. The vast majority of failures were associated with human error e.g. an incorrectly identified cow or the accidental transfer of residue containing milk to the bulk tank. However, 1 in 14 failures could not be attributed to a known cause, whilst another 1 in 14 were attributed to the presumed excretion of the antibiotic beyond the stated withdrawal period.

With this in mind, it is worth considering whether any of the processes on your farm could be improved to reduce the risk of a bulk tank failure. This includes, but is not limited to:

1) Ensuring that at least one member of the team are up to date with their MilkSure training (now required by many processors). Details are available at www.milksure.co.uk
2) Only administering medicines to cows once the cow has been clearly identified and the treatment recorded in the medicines' book
3) Keeping medicines for lactating cows and non-lactating animals separate
4) Ensuring that all medicines are correctly labelled, with the withdrawal period clearly visible
5) Practicing Selective Dry Cow Therapy to reduce the number of cows in the herd with potential antibiotic withdrawal at calving
6) Clearly marking cows that calve early until they are clear of any antibiotic withdrawals
7) Testing the milk of treated cows for inhibitory substances at the end of their withdrawal period, before returning their milk to the bulk tank

### DHHPS services during COVID-19

We are now back to operating pretty much as normal during the ongoing coronavirus situation, including blood sample analysis and reporting. The DHHPS office is staffed as normal. The DHHPS@ed.ac.uk email address is looked at daily for any queries.

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