

NEFA vs BOH: Which one to assess?

Concentration of non-esterified fatty acids (NEFA) and beta-hydroxy-butyrate (BOH) reflect mobilisation of adipose tissue in response to an imbalance between feed intake and milk production. Triglycerides catabolised from adipose tissue into NEFA enter the blood stream and are used by various tissues. When NEFA production is minimal, or continuous but slow, the liver effectively oxidises them for energy production. However, when NEFA production exceeds oxidation rate, ketones are formed. Prior to calving, serum NEFA are assessed because ketone formation is minimal. After calving, determining NEFA or BOH depends on what is being investigated.

Serum NEFA concentration is assessed when monitoring energy intake/negative energy balance. This is because NEFA

- increase sooner than BOH with onset of negative energy balance
- increase while BOH remains within reference if fat mobilisation is slow
- return to normal more rapidly after adequate feed intake is provided.

Bear in mind when selecting animals for herd monitoring of NEFA

- they are higher in ill cows
- they vary throughout the day significantly decreasing after eating
- heifers typically have higher concentrations than older cows
- individual variation is large and to get a representative herd sample, at least seven animals should be assessed.

Serum ketones rise when an animal is in a state of moderate to severe negative energy balance and the liver is flooded with NEFA. Typically, this occurs post-calving when the demand for lactose in the heavily lactating dairy cow is at a peak and suitable carbohydrate intake is inadequate due to poor feed quality or anorexia. Serum BOH accumulation may result in reduced appetite (if not already present), decreased milk production, weakness and neurological signs. Assessing serum BOH is useful in cows that are at risk for ketosis and in animals with clinical signs suggesting ketosis.

Some feeds cause production of butyrate in the rumen (e.g. silage, clovers, and feed with high sugar content such as molasses, kiwifruit, onions, potatoes) and can artificially increase serum BOH without an energy deficiency being present.

Summary

NEFA to assess energy intake/negative energy balance

BOH in cows at risk of ketosis or showing clinical signs of ketosis