

## 8. Summary

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### **The use of urine samples to estimate acid-base status and major element supply situation as part of a prophylactic herd health programme in dairy farms**

High milk yield and fertility fundamentally determine the economic efficiency of dairy farms. Improved performance increases susceptibility to metabolic disorders. Most of all acid-base equilibrium and major element supply are affected. Conventional examination methods occasionally provide only inadequate information. Therefore further diagnostic methods are necessary.

From November 1999 to April 2001 urine samples were taken predominantly from German blackpied cows as a part of a prophylactic herd health programme in ten dairy farms in Brandenburg, Mecklenburg-Vorpommern and Sachsen-Anhalt. Ten apparently healthy cows in second or greater lactation were selected randomly during each of five different stages of lactation (>3 weeks a.p., 3-0 weeks a.p., 0-1 week p.p., 3-5 weeks p.p., 15-18 weeks p.p.). In each farm the feed rations were controlled. The five groups were subdivided according to the presence feed additives such as acidogenic salts and sodium bicarbonate in the ration. For examination, the urine samples were pooled from each group. In these pooled samples the acid-base parameters pH and NABE (net-acid-base-excretion) were measured. For the investigation of major element supply, samples were analysed for magnesium, sodium, potassium, chloride, calcium and phosphorus. In addition creatinine was determined. In order to analyse influences on the determination of NABE some methodological examination were implemented.

Simple and fractionated NABE provided equivalent results for net-acid-base-excretion. In order to achieve reproducible results, urine samples should be analysed within three days after collection because ammonium concentration changes substantially after bacterial decomposition. Furthermore urine samples should be mixed thoroughly after deep-freezing because determination with or without sediment produces significantly different results. To prevent influences of the air on urine samples, sample containers should be filled up completely.

Urine parameters showed significant differences according to season and stage of lactation. Reaction to administration of feed additives such as acidogenic salts and sodium bicarbonate could also be observed. Whereas pH didn't change significantly between the groups NABE and bases decreased when acidogenic salts were added and increased under the alkaline load of sodium bicarbonate. Calcium and magnesium increased when acidogenic salts were added to the feed. After addition of sodium bicarbonate sodium concentration in urine samples increased whereas chloride excretion decreased occasionally below reference values.

Urine samples can be used to estimate acid-base equilibrium in cows. Additives to feed rations have an influence on the composition of urine causing changes in acids, bases and major elements.

NABE and calcium excretion may be useful to assess the application of acidogenic salts in order to prevent parturient paresis.

Data from this study indicate that reference values presently in use should be re-evaluated and adapted to the situation in high yielding dairy cows.