

Improving energy supply to dairy cows using Bicar Z

A dairy cow feed trial

(Translated from German to English)

Sodium bicarbonate is generally administered in order to avoid and prevent ruminal acidosis in dairy cows. Acidosis results from, inter alia, consumption of too many rapidly-fermentable carbohydrates. Or, put another way, when too much concentrated feed is consumed. On the other hand, high concentrations of energy are required in order to fuel high outputs.

In a dairy cow feed trial for the Schleswig-Holstein Chamber of Agriculture, carried out in Futterkamp, Dr. Mahlkow-Nerge investigated: How much can the quantity of concentrated feed be increased by means of the addition of Bicar® Z without a detrimental impact on the pH levels of dairy cows' paunches? Or, put another way: How much can the supply of energy to dairy cows be improved by using concentrated feed and Bicar® Z?

Trial structure

72 dairy cows were divided into 2 groups. The animals in trial group 1 received a TMR ration throughout the trial which had a fixed roughage:concentrated feed ratio.

In trial group 2, the roughage:concentrated feed ratio was altered to include more concentrated feed. The increase in concentrated feed content went hand-in-hand with a simultaneous addition of Bicar® Z. In this way it was possible for the pH values for both groups to remain at the same level.

Paunch pH levels were measured using test boli, which were inserted into the paunches and regularly transmitted data.

On 03.07, grass silage was changed to the first cutting of 2013, with more raw fibre.

After the wet chemical analysis of the grass and maize silage, the following feeding regime was implemented.

Group		1	1	2	2	2	2	2	2	2
Period		up to 02.07.	from 03.07.	up to 03.06.	04.06.- 13.06.	14.06.- 02.07.	03.07.- 08.07.	09.07.- 22.07.	23.07.- 07.08.	07.08.- 20.08.
R CF	kg	60 . 40	60 . 40	54 . 46	50:50:00	50 . 50	50 . 50	50 . 50	54 . 46	54 . 46
Bicar® Z	g	0	0	200	219	250	250	300	250	150
concentrated feed	kg/day	9.3	9.3	10.6	11.6	11.6	11.6	11.6	10.6	10.6
Energy	MjNEL/kgTM	7.3	7.1	7.3	7.4	7.4	7.2	7.2	7.2	7.2
nXP	g/kg TM	171	172	173	176	175	173	173	170	170
Raw fibre	g/kg TM	157	172	149	144	144	156	156	162	163
Sugar and Starch	g/kg TM	288	267	295	301	301	291	290	283	284
Trial phase				1	2	3	3	4	5	6

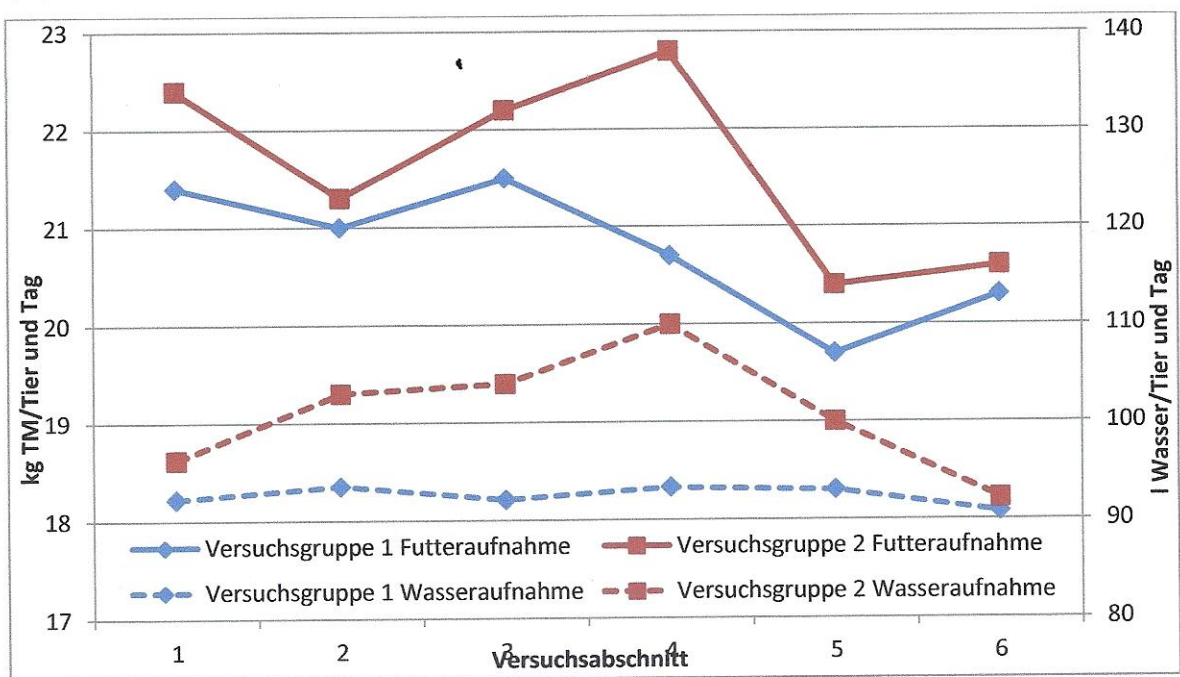
(according to
Dr. Katrin Mahlkow-Nerge)

Trial outcomes:

paunch pH level

In both groups, relatively low pH levels were recorded. In group 1, the daily average was between 6.1 and 6.2 over the whole trial period. In group 2, this figure was consistently 0.1 lower. This difference was not statistically reliable. **The goal of keeping pH levels more or less constant was thus achieved in both groups.**

Feed and water intake



(according to
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Feed and water intake were higher in trial group 2 in all phases of the trial. The higher water intake can be explained by the elevated sodium content thanks to the Bicar[®] Z.

The limits for use of Bicar[®] Z were also reached in this trial. The cows drank the most Bicar[®] Z given (300g) in phase 4. The water must be excreted, which led to rather soft stool and soiling of the cattle. For this reason, a further increase in the proportion of concentrated feed was ruled out.

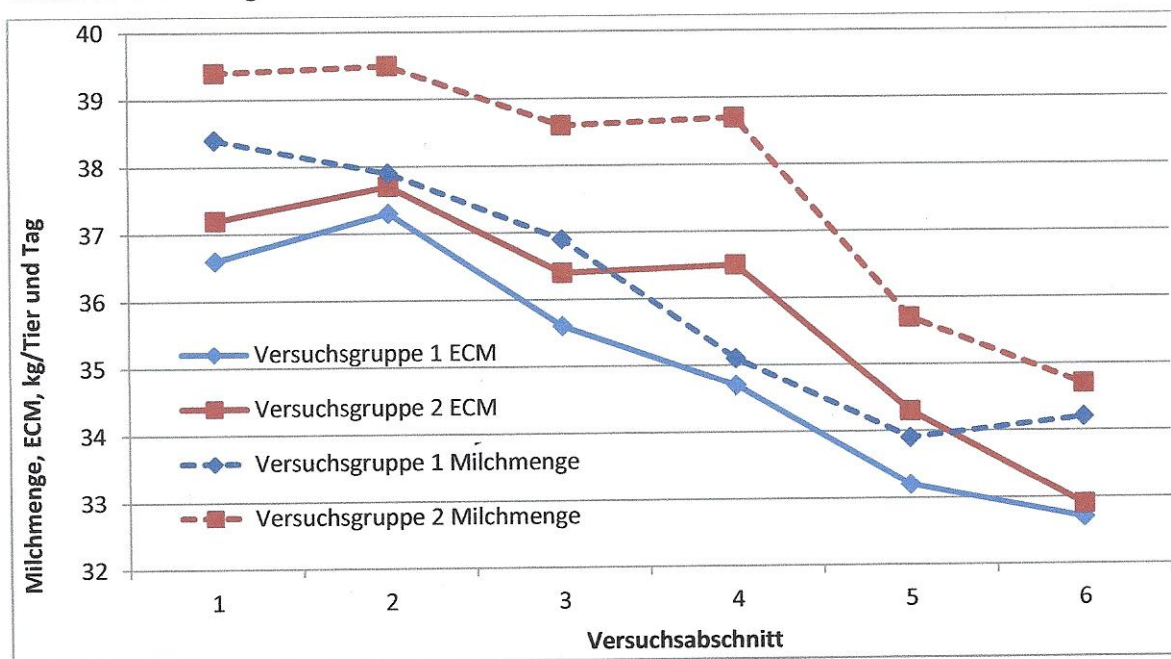
Milk production

The higher feed intake among trial group 2 was directly translated into milk production by the cows.

The largest differences in milk output between the two groups were achieved in phase 4, where the largest proportion of concentrated feed was used and the greatest amount of Bicar[®] Z was administered.

The fat contents in trial group 2 were between 0.16% and 0.24% lower than those in group 1. On the other hand, the protein content was almost identical across the two groups in spite of the higher milk output in group 2.

Grafik 6: Milchmenge und ECM im Versuchsverlauf



(according to
Dr. Katrin Mahlkow-Nerge)

Further outcomes:

The **changes in weight** among the animals were rather more positive in group 2 and came to an increase of 26kg in group 1 and 28kg in group 2.

Regular urine samples were taken from the animals. All **urine parameters** in both groups fell within the normal range. Only the urine pH levels were slightly higher in both groups. The Na excretion in trial group 2 was higher than in group 1, as a result of the higher volume of Bicar® Z, but it was still within the normal range. In both groups, relatively high **NEA levels** were recorded. This is an indication that, in spite of low fat levels, no acidosis occurred.

Shortly before the end of the trial, a **hoof inspection** was carried out. In both groups, a tendency towards slight laminitis was discovered in almost all animals. In group 1, 53% of animals were affected, in group 2 only 41%. The main cause was Mortellaro.

Other **illnesses** and corresponding **treatments** were documented as well.

In trial group 1, 24 animals needed treatment. In the Bicar® Z group, group 2, only 12 required treatment.

Conclusion:

It has been known for a long time that Bicar[®] Z can balance out an inadequately structured diet for dairy cows. However, is it also possible to increase the volume of concentrated feed yet further if the paunch pH level is stabilised with Bicar[®] Z? And what effect does this have? This trial should answer these questions.

An increase in concentrated feed of up to 2.3kg with a combination of 300g Bicar[®] Z led to a significant negative change in the paunch pH level. The urine parameters such as NEA also gave no indication of acidosis. In accordance with this, the quantity of Bicar[®] Z was sufficient to maintain an optimal ruminal environment. Also, the addition of this quantity of concentrated feed in the trial led to an **increase in output of up to 3.6l of milk** compared to the control group.

In future, dairy cows can be better fed on a combination of more concentrated feed and Bicar[®] Z, and will have a better energy balance. In the trial, animal health even tended to be better in the Bicar[®] Z group. This form of feeding lends itself to high performance groups, but also, for example, feeding by milking robot, where the concentrated feed is administered separately. In such cases, the Bicar[®] Z would be mixed directly into the concentrated feed.

It will surely be necessary to conduct more experiments to establish how much additional concentrated feed a cow can tolerate, and how much Bicar[®] Z is required to accompany it. Commercially available paunch test boli, which send constantly updated pH data, would be very useful to the researcher in this instance.