

Comparison of pHix-up vs other buffer mix products

EFFECT ON PH

DURING IN VITRO FERMENTATION IN RUMEN FLUID

IN VITRO TESTING - BUFFER MIX

In vitro rumen fluid analysis has been tested in artificial rumen at GIC (Global Innovation Center, Saint-Malo). A total of 23 in vitro incubations were conducted in order to test 14 different buffer solutions in comparison to pHix-up. The method consists of measuring change in rumen pH after 2, 4, and 6 hours of in vitro fermentation. At the beginning of the test, the fermentation substrate is composed of rumen juice and an acidogenic diet (composed of corn silage, soybean meal and energetic concentrates). Initial pH is adjusted to 5.5. The product to be tested is incorporated in the substrate, measuring its effect on rumen pH during the fermentation period.

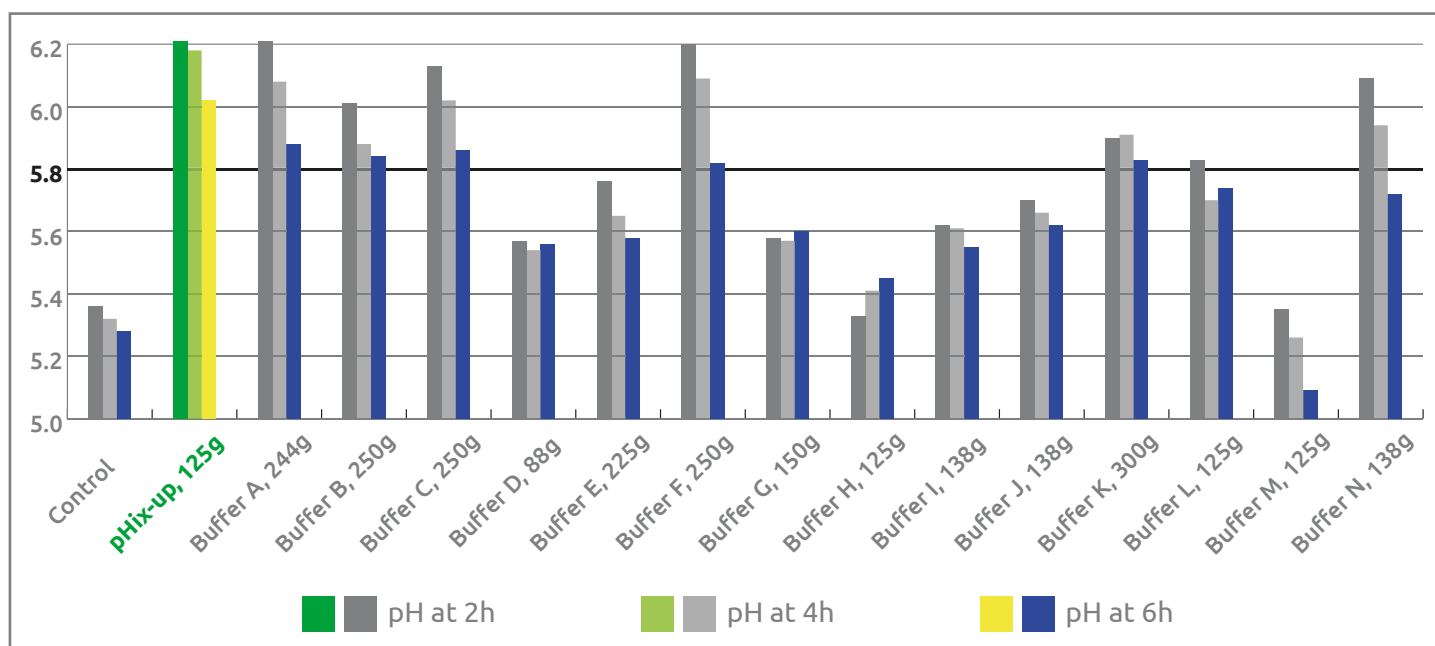


Figure 1: Effect on rumen pH of different buffer products during in vitro fermentation in rumen fluid

During each incubation (n=23), a control substrate without any buffer was also monitored. There was no statistical difference regarding the pH level at 2h, 4h, 6h ($p=0.53$, $p=0.44$, $p=0.089$) between the control substrates, meaning that the products can be compared even if they were incubated at a different time.

Dosage pHix-up vs others

pHix-up was tested at an equivalent dosage of 125g/cow/day, while the other buffers were tested at an equal or higher dosage (125-300g/cow/day), except for Buffer D, which was tested at a dosage equivalent to 88g/cow/day (recommended dosage).

Composition of different mixes vs pHix-up

The commercial buffers tested, except for pHix-up, are a mix of different raw materials, including sodium bicarbonate, magnesium oxide, calcium carbonate and others, at different incorporation rates.

Effect on pH and persistence

Table 1 presents a comparison of pHix-up vs different buffers effect on the pH during an in vitro fermentation in rumen fluid in terms of effect on the pH and its persistence. The products can be characterized using two criteria:

- effect on ruminal pH: increase of pH after 2h
- persistence of the effect on ruminal pH: a products ability to keep the pH stable between 2 and 6 hours of fermentation.

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During the in vitro fermentation, the pH of the medium is measured at 3 time points at 2, 4 and 6 hours. The persistence of the pH is a ratio (in %) between the pH after 6 hours of fermentation and the pH after 2 hours. It represents the pH stability of the medium thanks to the addition of different product in the rumen fluid. If this ratio is close to 100%, the pH is stable until 6 hours, if it is below 97%, it means that pH level decreases over time.

Table 1: Effect on pH of different products during in vitro fermentation in rumen juice

Product	Average dose tested (g/cow/day)	Increase in pH above 5.8	Persistent effect or stability of the rumen pH	Conclusion*
pHix-up	125	✓	✓	✓ ✓
Buffer A	244	✓	✗	✓
Buffer B	250	✓	✗	✓
Buffer C	250	✓	✗	✓
Buffer D	88	✗	✓	✗
Buffer E	225	✗	✗	✗ ✗
Buffer F	250	✓	✗	✓
Buffer G	150	✗	✓	✗
Buffer H	125	✗	✓	✗
Buffer I	138	✗	✓	✗
Buffer J	138	✗	✓	✗
Buffer K	300	✗	✓	✗
Buffer L	125	✗	✓	✗
Buffer M	125	✗	✗	✗ ✗
Buffer N	138	✓	✗	✓

*Conclusion
 ✓ ✓ Efficient and stable
 ✓ Efficient but not stable
 ✗ ✗ No effect on both parameters
 ✗ Not efficient on the pH

Among the 15 tested buffer mix products present on the market, pHix-up is the only one that combines both positive effects on the pH: increasing and maintaining the pH at a stable level (pH>6.0) for at least 6 hours of fermentation.

