

Table S1 The components of the buffer solution for *in vitro* experiments

| Items ¹ | Contents (mL/L) |
|-----------------------|-----------------|
| Water | 474 |
| Microelement solution | 0.118 |
| Artificial saliva | 237 |
| Macroelement solution | 237 |
| Resazurin solution | 1.18 |
| Reductant solution | 47.4 |

¹ 100 mL microelement solution contains: 13.2 g CaCl₂•2H₂O, 10.0 g MnCl₂•4H₂O, 1.0 g CoCl₂•6H₂O, 8 g FeCl₂•6H₂O; 100 mL Artificial saliva contains: 3.50 g NaHCO₃, 0.40 g NH₄HCO₃; 100 mL Macroelement solution contains: 0.57 g Na₂HPO₄, 0.62 g KH₂PO₄, 0.06 g MgSO₄•7H₂O; 100 mL Resazurin solution solution contains: 10 g C₁₂H₇NO₄; 100 mL Reductant solution contains: 625 mg Na₂S•9H₂O, 0.16 g NaOH.

Table S2 Ingredient and chemical composition of the basal diet fed fistulated cows during the *in vitro* experiment (DM basis)

| Ingredients | Amount (g/kg DM) | Ingredients | Amount (g/kg DM) |
|--------------------|------------------|------------------------------|------------------|
| Whole corn silage | 521 | Limestone | 4.87 |
| Alfalfa | 69.31 | NaCl | 2.58 |
| Soybean meal | 79.76 | MgCl ₂ | 0.87 |
| Corn | 38.05 | Choline | 1.73 |
| Flaked corn | 86.78 | Premix ¹ | 3.52 |
| Extrusion soybean | 9.76 | Water | 86.82 |
| Soybean hull | 23.14 | Total | 1000 |
| Cottonseed | 29.05 | Nutrient levels ² | |
| Fatty powder | 8.73 | Dry matter (g/kg as-fed) | 507 |
| Yeast culture | 3.24 | OM (g/kg DM) | 921 |
| Detoxication agent | 0.52 | NEL (MJ/kg DM) | 8.16 |
| NaHCO ₃ | 6.43 | CP (g/kg DM) | 170 |
| KHCO ₃ | 3.20 | aNDF (g/kg DM) | 310 |
| CaHPO ₄ | 2.41 | ADF (g/kg DM) | 203 |

¹ Premix provided the following per kg of the total mixed ration: Mn 6 000 mg, Fe 4 800 mg, Zn 9 000 mg, Cu 2 600 mg, I 120 mg, Se 80 mg, Co 70 mg, VA 130 000 IU, VD3 36 000 IU, VE 465 IU.

² NEL: net energy for lactation. NEL was a calculated value, while the other values were measured.