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**Evaluation of the reaction capacity of early warning indicators to failures in biogas production systems**

**Evaluación de la capacidad de reacción de los indicadores de alerta temprana ante fallas en sistemas de producción de biogás**

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**Supplementary material**



Figure S1. RSD of biogas productivity. R1 in red and R2 in blue.

Table S1. Shewhart control parameters.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| EW | Reactor | µ | σ | LCL | UCL |
| d(%CH4/%CO2)/dt | R1 | 0.04 | 0.39 | -1.12 | 1.2 |
|  | R2 | 0.04 | 0.35 | -1 | 1.08 |
| d(VFA)/dt | R1 | -8.1 | 85.21 | -263.72 | 247.52 |
|  | R2 | -6.75 | 92.3 | -283.67 | 270.16 |
| d(VFA/TA)/dt | R1 | 0 | 0.02 | -0.08 | 0.07 |
|  | R2 | -0.01 | 0.02 | -0.07 | 0.06 |
| d(IA/PA)/dt | R1 | -0.02 | 0.04 | -0.15 | 0.1 |
|  | R2 | 0.01 | 0.03 | -0.07 | 0.09 |
| d(Productivity/VFA)/dt | R1 | -3.01x10-5 | 6.51x10-5 | -2.25x10-4 | 1.65x10-4 |
|  | R2 | -3.69x10-10 | 1.29x10-9 | -4.23x10-9 | 3.49x10-9 |

|  |  |
| --- | --- |
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Figure S2. Shewhart control charts for the EWs of R2.



Figure S3. Behavior of the relationship between VFA and biogas productivity proposed as EW for R2.

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