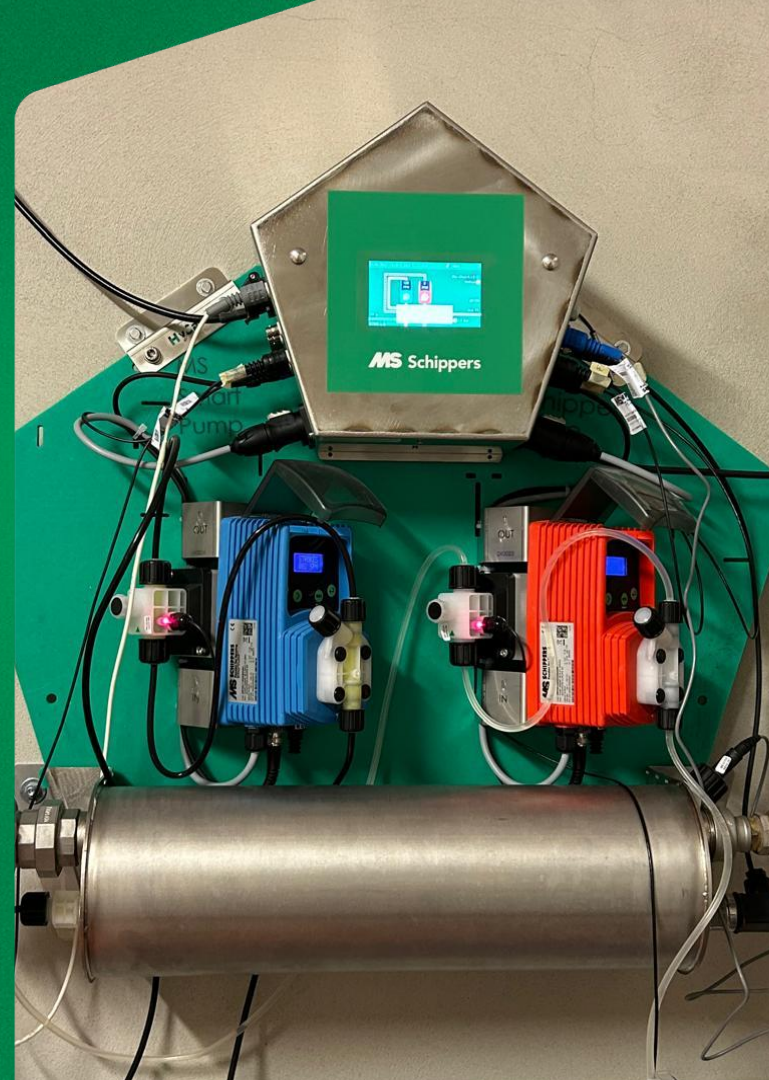


MS Schippers

MS Smart Pump

The world's first adaptive water hygiene solution for livestock farming.



Content of this presentation

Status Quo: Current challenges in dosing liquid additives

The Solution: MS SmartPump

Patented resting-phase control

MS SmartPump vs. conventional systems

Applications and practical field tests

The benefits at a glance

The Status Quo: a “blind” system

Why conventional dosing pumps compromise modern water hygiene.

Current challenges in dosing liquid additives

- **Consumption rate impacts dosing accuracy:** fluctuating water of feed consumption makes precise dosing difficult.
- **Homogeneity:** varying solubility, viscosity, and mixing methods complicate uniform distribution.
- **Water quality:** fluctuations in pH, mineral levels, and temperature affect stability and efficacy.
- **Environmental changes:** real-time monitoring and adjustments are required to ensure accurate dosing.

The core problem: biofilm resistance

Invisible danger: conventional pumps does purely based on flow rate.
This means:

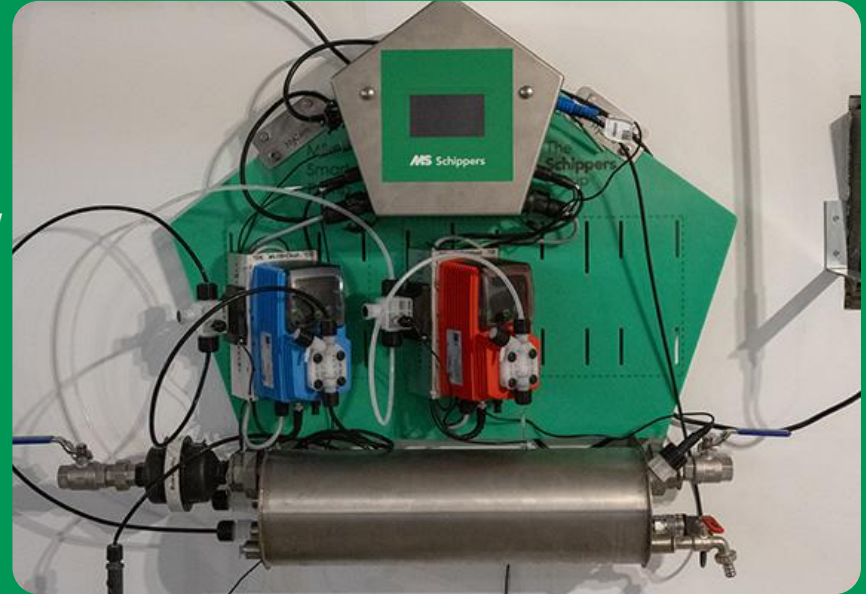
- **No impact:** The cleaner passes through the pipes too quickly at high flow rates.
- **Acid stress:** imprecise dosing leads to fluctuating pH levels in the animals stomach.
- **Biofilm growth:** no cleaning takes place during the critical drinking breaks.



The solution: MS SmartPump

Revolutionary dual-dosing logic: the MS SmartPump closes hygiene gap through an intelligent, behavior-controlled system.

- **Adaptive:** adjusts in real time to pH levels, flow rate, and temperature.
- **Precises:** Does acids (MS GoldFeed) only during the activity phases.
- **Patented:** Uses the animals resting phases for high-performance cleaning.



Patented Resting-Phase Control

Resting phase

The System fully automatically detects when animals are resting.

Contact time

Sanitation products (Di-O-Clean) remain undisturbed in the line at low flow rates.

Maximum efficacy

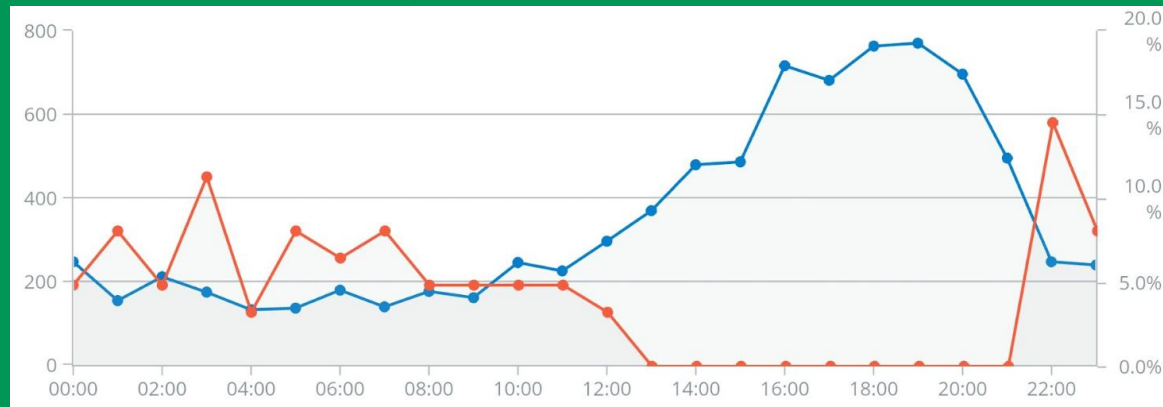
Biofilms are broken down highly efficiently without entering the animals stomach.

Result: Superior hygiene with significantly lower disinfectant consumption (50–70% reduction).

Example: Adaptive Di-O-Clean dosing for line cleaning

The SmartPump continuously analyzes drinking behavior and doses MS Di-O-Clean exclusively during low-flow phases (low water flow).

During high water flow (peak drinking times), the pump completely shuts off Di-O-Clean dosing – ensuring no active agent enters the animals unused.

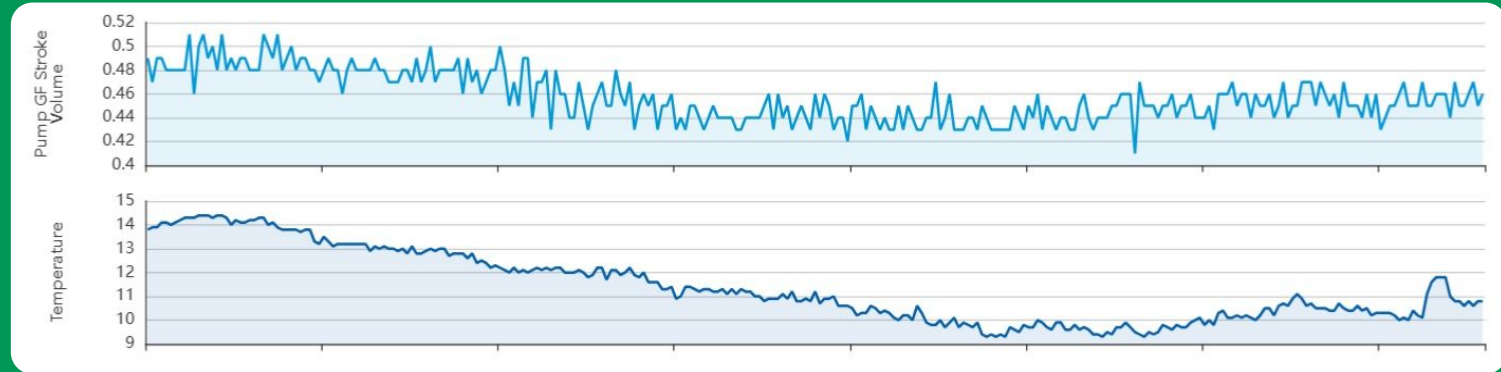


Orange line (Di-O-Clean dose): Shows spikes precisely during the troughs of the drinking water curve (low flow).

Blue line (Water flow rate): During high peaks (peak drinking times), the orange line drops to 0%.

Example: Adaptive Di-O-Clean dosing for line cleaning

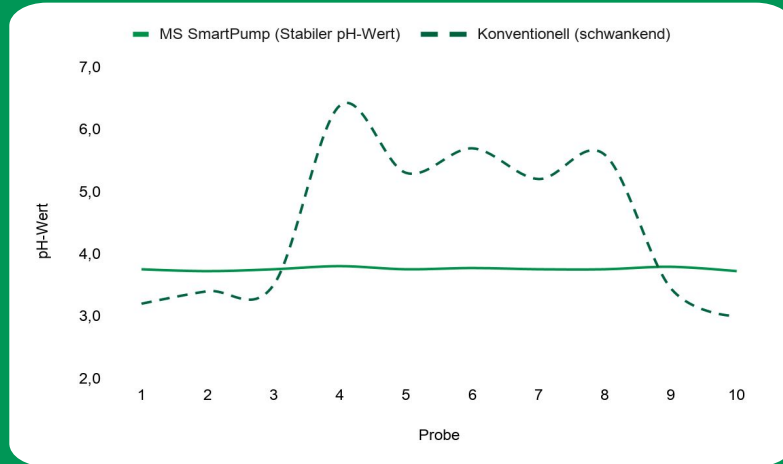
The SmartPump adjusts MS GoldFeed dosing based on temperature influences, as temperature affects the viscosity of MS GoldFeed.



Lower chart (Temperature °C): Shows the temperature curve of the drinking water/medium over time. The temperature gradually drops from approx. 14.5 °C to below 9.5 °C.

Upper chart (Pump GF Stroke Volume): Shows the stroke volume for MS GoldFeed (acid) automatically readjusted by the SmartPump.

MS SmartPump vs. Proportional-Pump



pH measurement of 10 consecutive spot samples (bottles) under fluctuating water flow rates.

The MS SmartPump instantly correlates sensor data to automatically adjust to the following parameters:

- Temperatur
- Water pressure
- Water composition
- Water consumption
- MS GoldFeed type
- Pump operating speed
- Pump age
- Impact of water infrastructure on mixing quality

Improved economic efficiency

-70%

Product Consumption:

Thanks to adaptive volume control and targeted dosing during low-flow periods.

Potential savings

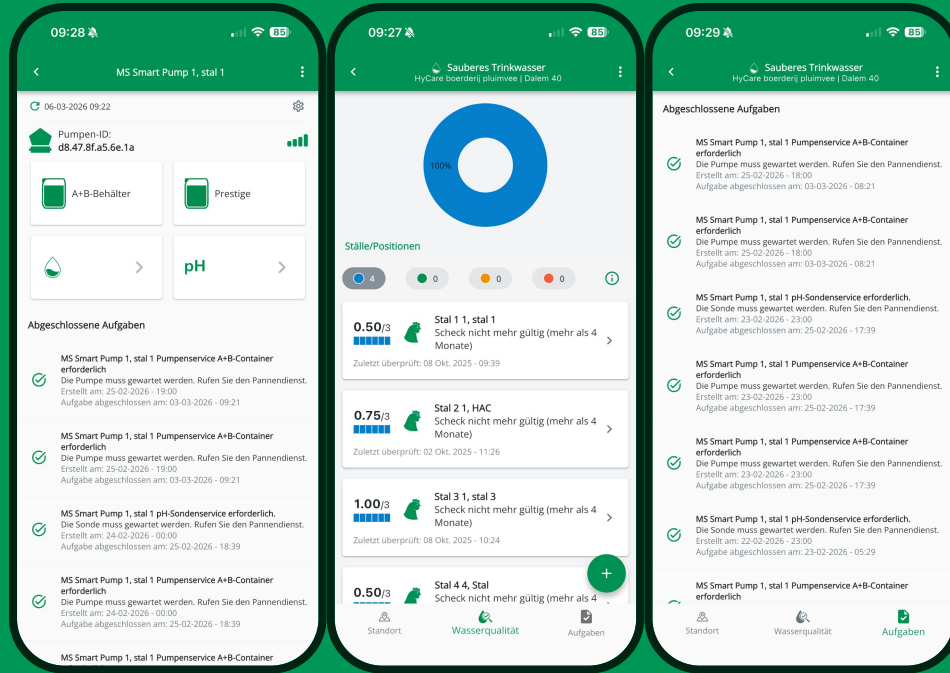
- **Lower Costs:** Drastic reduction in Di-O-Clean consumption.
- **Time Savings and Error Reduction:** Automated programs instead of manual control.
- **Animal Welfare:** Stable pH levels ensure optimal digestion and performance.

Technology Comparison:

Conventional proportional dosing pumps react neither to fluctuations in raw water pH levels nor to animal drinking behavior, leading to inaccurate control during acidification. Furthermore, these rigidly coupled systems dose cleaning products independently of flow rates, causing active agents to end up uselessly in the animals' stomachs during high flow, while insufficient product is present during critical resting periods for effective biofilm breakdown.

Feature	Standard systems	MS SmartPump
Dosing Logic	Rigid (percentage-based)	Adaptive (Demand-based)
Pipeline sanitation	Water-flow dependent only	During resting phases
pH Accuracy	Inaccurate / Progressive	precise (Sensor-controlled)
Monitoring	Manual on-site	Cloud-based (HyCare App)

HyCare App Integration



24/7 Real-Time Monitoring

- **Mobile Control:** Status and error analysis directly via smartphone.
- **Alerts:** Automatic push notifications when containers are empty.
- **Remote Support:** Experts can optimize parameters online.

Applications & Field Practice

The MS SmartPump is equally suitable for the poultry, swine, and dairy industries.



Practical Example: Poultry

"Di-O-Clean consumption is significantly lower in the barn using the MS SmartPump, yet we still have cleaner lines."

- Jeannette Redmann, Layer Farm in Mecklenburg-Vorpommern with 39,990 Layers



Barn Dashboard

1. pH Level Measurement (Red Curve) and Pressure Measurement (Blue Curve):

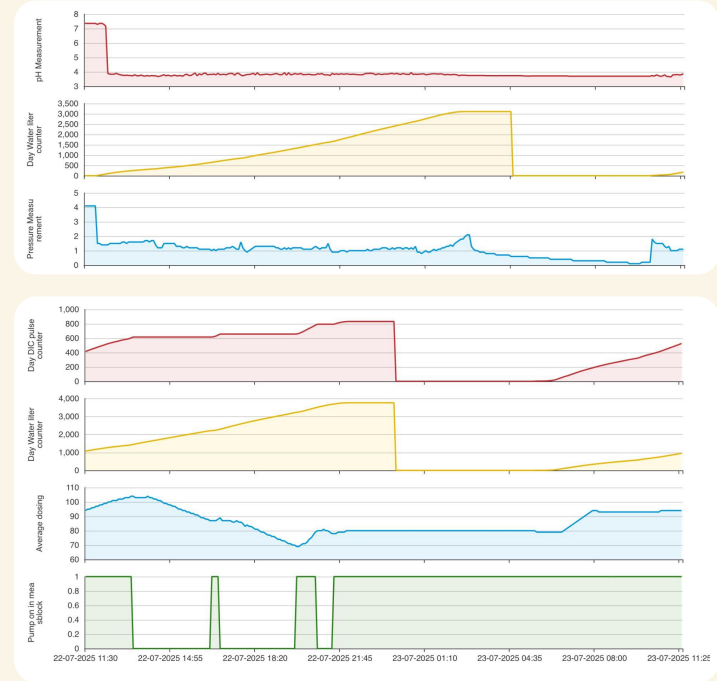
The MS SmartPump ensures a consistently homogeneous water-acid mixture, even with fluctuating line pressure or temperature changes. Conventional systems dose in bursts, causing pH fluctuations ("sine waves") that can result in uneven intake and unnecessary overconsumption.

2. Pump ON / Di-O-Clean Dosing (Green Curve):

The MS SmartPump doses Di-O-Clean, a chlorine dioxide-based agent for pipeline sanitation that reliably removes biofilm and prevents its re-formation.

During high water consumption periods (e.g., after feeding), dosing is paused to prevent the agent from being consumed too quickly before it has sufficient contact time in the pipeline.

During low-consumption periods (e.g., at night), it is targetedly applied to achieve maximum efficacy while maximizing savings.



Practical Example: Swine

"What sets this pump apart is that it doesn't just add something to the water—it does so in an intelligent way: as much as necessary, but as little as possible overall, to save costs."

- Bernhard Langehaneberg, Swine Farmer from Coesfeld, Germany



Insights & Observations Post-Weaning

- **Behavior-Controlled Protection:** The system doses the pipeline sanitation product during resting phases. During the day, when water flow is high, dosing stops to prevent the agent from ending up in the animals' stomachs.
- **Immediate Feed Intake:** Piglets show a measurably higher feed intake immediately following the critical first few days post-weaning.
- **Reduction in Medication Use:** During the critical initial phase post-weaning, zero medication was required, thanks to stable water hygiene and the optimized dosing of acids and nutritional supplements.

Benefits at a Glance

Universal application

The MS SmartPump is designed as a multi-species solution, equally suited for swine, poultry, and dairy operations.

Patented efficiency

By dosing during drinking pauses, biofilm is removed more effectively than with conventional methods.

Product Savings & Error Minimization

Maximum Cost Efficiency Through Automatic Adaptive Flow Control: The system doses sanitation products highly efficiently during low flow rates (maximum contact time) and minimizes usage during high flow rates.

Animal health

A consistently stable pH level and germ-free water massively reduce infection pressure and boost animal performance.

Digital Management

Integration into the HyCare App enables real-time error analysis, remote expert support, and automated alerts for empty canisters or pump faults.

Need-Based, Effortless Adjustment

Dosing and product selection can be adjusted with ease. If farmers observe changing symptoms or needs in their livestock, they can adapt the program immediately and flexibly.

Questions about this innovation?

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