



A GLANCE AT THE KEY FINDINGS OF THE NATSURV 4: WATER AND WASTEWATER MANAGEMENT IN THE DAIRY INDUSTRY¹

Notes on the key findings and recommendations of the NATSURV 4 edition two

BACKGROUND

1. The Water Research Commission (WRC) contracted the University of Cape Town (UCT) and Isle Utilities to investigate the water use and wastewater management, in the South African dairy industry. The objectives of the investigation were described as follows:
 - *“To provide a detailed overview of the dairy industry in South Africa, changes since the first edition, and projected changes;*
 - *To assess the current industrial process steps and determine the water consumption and wastewater generation throughout these process steps; and*
 - *To evaluate the dairy industry’s current water and wastewater management processes and to formulate appropriate recommendations for water use targets, reuse, recycling, technology adoption, water pinch, and best practice.”*
2. On 26 October 2022, the Office of SAMPRO, organised a meeting with the producers of processed milk and the manufacturers of other dairy products, who are members of SAMPRO. The purpose of the meeting was to brief the members on the above study and the objectives of the study and what it aims to achieve.
3. In the above meeting, a dairy industry representative team was established, to interact with the research team for the study. The representative team included the Manager of the Research Project of Milk SA (Dr Heinz Meissner), the Manager of the Environment Sub-Project of Milk SA (Dr Colin Ohlhoff), the Senior Economist of SAMPRO (Dr Ndumiso Mazibuko), and the Managing Director of Dairy Standard Agency (Mr Jompie Burger). The team was also at liberty to consult with the CEO of SAMPRO as well as with technical experts, who are active in the dairy industry and input suppliers of the dairy industry.
4. On 24 November 2022, the dairy industry representatives’ team, met with the research team from UCT and Isle Utilities. The discussions were mainly around the aim of the study and the Terms of Reference for the study. It came out in the discussions, that this would also serve as a benchmarking study, which will be measured against the 1989 NATSURV, since the 2014 NATSURV was not accepted by the Water Research Council (WRC). The data and information received will also be benchmarked with international data and literature on water and wastewater management. The discussions were also around which dairy products to select, it was agreed

¹ This report is based on the full report of the “NATSURV 4: Water and Wastewater Management in the Dairy Industry, Edition 2.”

on Milk (UHT and Fresh Milk), Yoghurt, and Butter. The representative team indicated to the Research team that the selected dairy products, should not be misinterpreted as a reflection of the entire industry. It was also agreed that the representative team and other stakeholders would be given a chance to review the draft report before the final draft is published.

5. On 29 June 2023, the dairy industry representative team met with the research team from UCT and Isle Utilities. The purpose of the meeting was for the research team from UCT to present the draft report to the representative team. The Dairy Industry Representative team made comments to the presentation and written comments based on the draft report and shared them with the research team for their consideration. Furthermore, due to the minimum number of processors that participated in the study, the dairy industry representative team highlighted to the research team that it should be indicated in the report that this is not a reflection of the whole industry.
6. On 12 February 2024, the WRC published the NATSURV 4: Water and Wastewater Management in the Dairy Industry final report. The methodology that was used for the study included a literature survey, identification of stakeholders, workshops, circulation of the questionnaire, site visits and interviews, collation of all data and information, analysis of national and international data, circulation of the draft NATSURV 4 report and finalisation of the updated NATSURV 4 report.

KEY FINDINGS OF THE NATSURV 4: WATER AND WASTEWATER MANAGEMENT IN THE DAIRY INDUSTRY

7. The section which follows, highlights some of the findings of the NATSURV 4, the report found that production volumes doubled between 1989 and 2022. Notably, the average Specific Water Intake (SWI) has decreased from 7 litres of water per litre product to a more efficient 2.4 litres, with a smaller range within the same time-period. The report highlights, that this could be attributed to technological advancements and process optimisation. Furthermore, the SWI values of selected dairy products such as yoghurt, cheese, and sterilised or UHT milk (from ultra-high temperature processing, or ultra-heat treatment) have improved since 1989. In the case of milk and butter, it differs; although some companies have progressed to SWI ratios lower than those recorded in 1989, others are now generating higher SWI ratios. The SWI target in the original NATSURV was 1.5 L/L milk, and two of the participating milk processors in this study had an average SWI lower than the 1989 benchmark.
8. The analysis of literature in the study highlights that international SWI values range from 0.6 to 9.44 L/L product, while SWI ratios for South African processors producing any combination of milk, yoghurt, butter, or cheese range from 1 to 5 L/L product. The upper limit of 9.44 L/L product could potentially be a consequence of outdated technology in 2003, given that the remaining reported values are from subsequent years, with the majority below 5 L/L product.
9. The dairy processors who participated were also surveyed on the characteristics of their wastewater streams and asked which is the most prominent; 50% of participating dairy processors responded that chemical oxygen demand (COD) was the most problematic. In most

cases, the wastewater streams from the dairy processing plants were combined and discharged as one effluent stream. According to an analysis of best practice options implemented by the companies surveyed, the majority are aware of the need to optimize water use through internal reuse.

10. The findings further highlight that there is a clear relationship between energy usage and both water consumption and wastewater generation. Minimizing water consumption, for example, results in lower energy requirements for pumping, heating, and treating water. The study also highlights that many of the participating processing facilities are exploring renewable energy sources such as solar power, compressed natural gas (CNG), and biogas generated from the anaerobic digestion of dairy effluent.
11. Some of the companies surveyed had specific wastewater quantity targets. These included a 1% annual reduction in wastewater generation and a recycled water target of more than 60%. Dairy processors are transitioning to cleaner production methods to reduce water consumption and wastewater costs. Aside from the potential commercial drivers, the industry has recognised that demonstrating the principles of sustainability and Corporate Social Responsibility (CSR) is critical to maintaining a social licence to operate, which is increasingly influencing consumer behaviour. Furthermore, the study also highlights that some of the companies interviewed have made significant progress in solar panel installations.

RECOMMENDATIONS OF THE OF THE NATSURV 4: WATER AND WASTEWATER MANAGEMENT IN THE DAIRY INDUSTRY

12. The recommendations of the study highlight that *“future endeavours are required to enhance awareness and support companies in identifying avenues for reduction. Stakeholders should start with implementing short-term water management strategies such as measuring, monitoring, and raising staff awareness in order to optimise water use through preventative measures. However, after considering the short-term possibilities, stakeholders should consider the long-term cost of being water inefficient”*. Furthermore, the report highlights that *“water scarcity justifies water management practices, as unlike energy, there is no backup for water shortages. Stakeholders could prepare for water scarcity proactively, recognising its intrinsic value rather than focusing solely on financial return on investment. Greater emphasis on business resilience and self-sufficiency of water and energy supplies would tip the balance of decision-making in favour of adopting best practices more widely”*.

Concluding Remarks

13. The findings highlighted that there have been some improvements in South Africa in terms of water and wastewater management in the Dairy industry, since the 1989 NATSURV. The report highlights some opportunities for improvements in terms of water and wastewater management and further acknowledges that these depend on the unique characteristics of each dairy site.

14. The findings of the research further highlight that South African dairies align with international trends and are consistent with worldwide dairy processor norms in terms of specific water intake ratios for milk and yoghurt, demonstrating progress in water efficiency. This could be attributed to technological advancements and process optimisation. According to the analysis, the majority of the participating dairy processors are transitioning to cleaner production methods to further reduce water consumption and wastewater costs. Furthermore, the findings highlight that progress has been demonstrated in energy-saving initiatives by implementing energy efficiency solutions such as utilising low-grade energy, installing energy-efficient equipment, and specifically upgrading infrastructure to reduce emissions and save energy.

The full report of the “NATSURV 4: Water and Wastewater Management in the Dairy Industry, Edition 2”, is available at the following link: [NATSURV4 ed 2 \(by Isle Utilities and University of Cape Town\) \(wrcwebsite.azurewebsites.net\)](#).

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