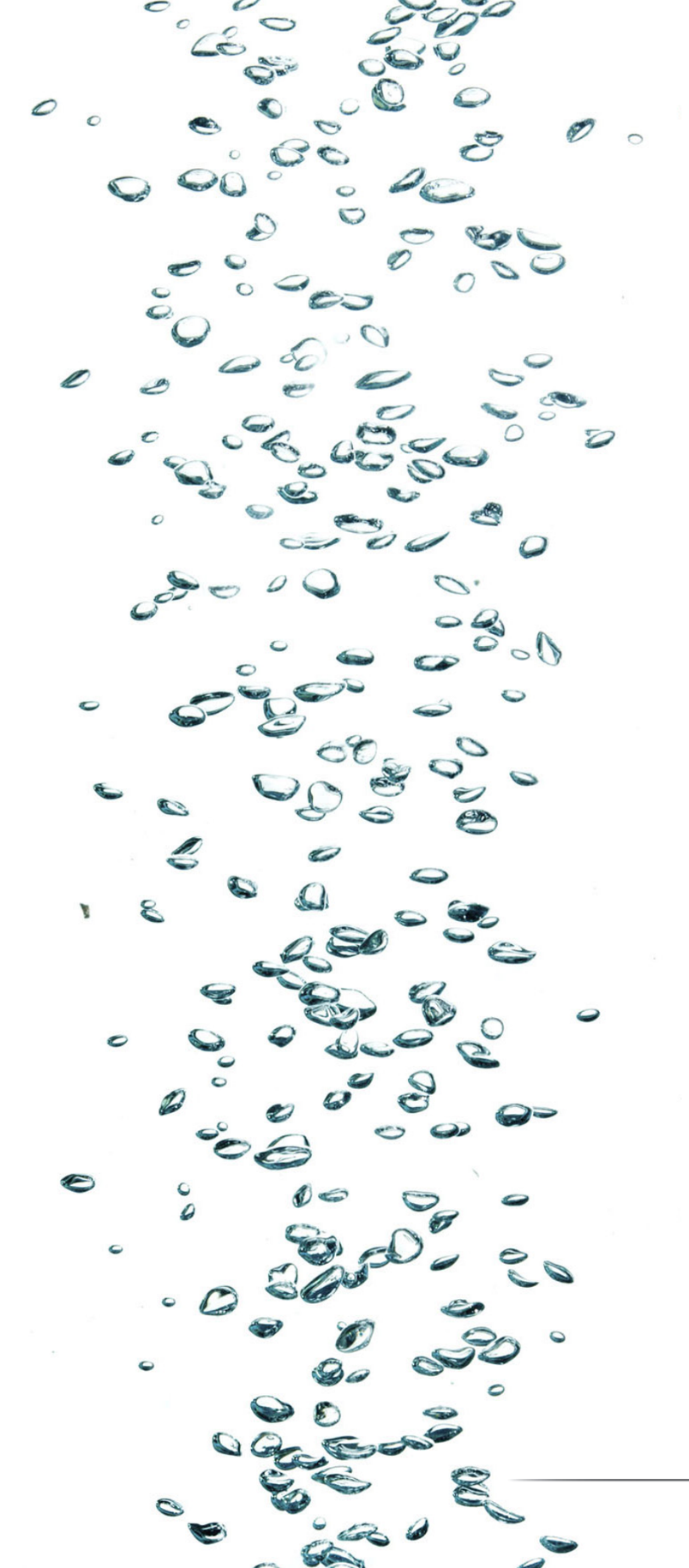


nöz

Ozone Spray Nozzle System

www.ArcAqua.com

Who is ArcAqua?

WE'RE A TEAM THAT'S CREATED BUSINESS SUCCESS IN THE PAST

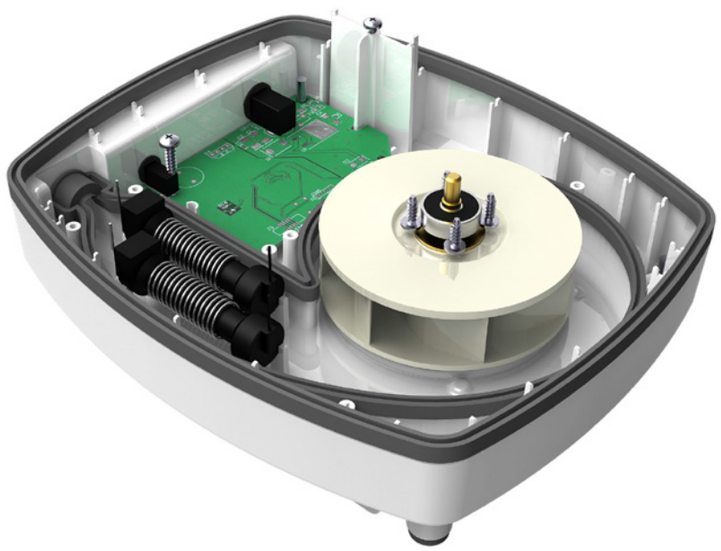
- We took an international franchise to the top-spot by a focusing on service delivery and innovation.
- We truly understand the hospitality industry and what it takes to succeed in it.
- We became the leading installer of ozone cleaning systems in South Africa.
- We saw an opportunity to develop a concept that would have major impact in hospitality – restaurants, hotels, foodstuff resellers.
- We patented the concept and in partnership developed the product to the point of commercial release.

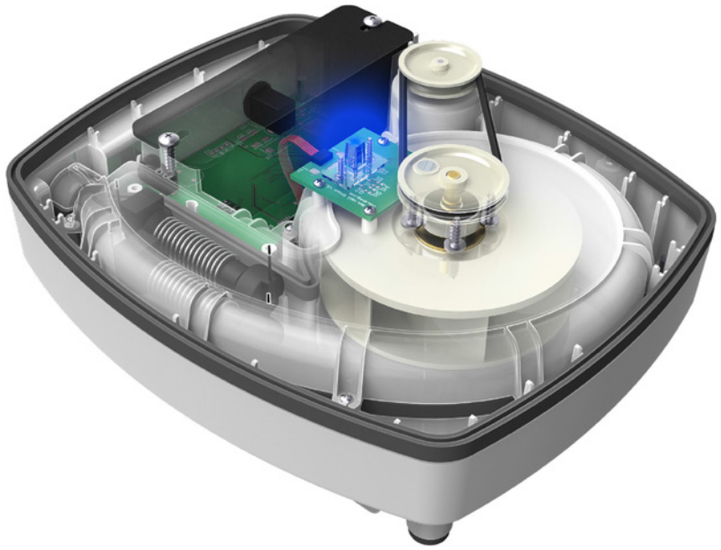
WE'VE TEAMED UP WITH ONE OF THE MOST RESPECTED BUSINESSES IN SOUTH AFRICA, REMGRO - VIA THEIR SUBSIDIARY INVENFIN.

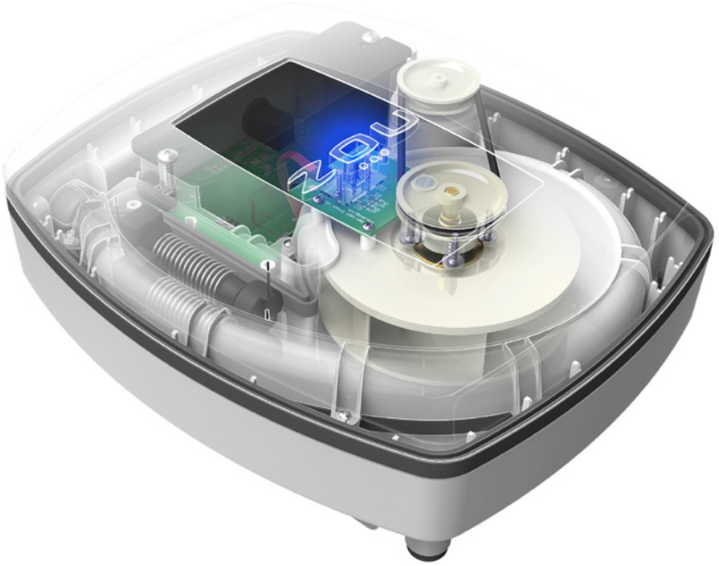
invenfin

What is nöz

INNOVATIVE CLEANING AND SANITIZING







A highly efficient and cost-effective way to harness the sanitizing power of Ozone, package it as a small and easily deployed sanitizing unit – the nöz

Agenda

WHAT PROBLEMS ARE WE ADDRESSING?

WHAT IS NOZ AND HOW DOES IT WORK?

WHAT ARE THE BENEFITS OF NOZ?

WHO WILL BENEFIT – WHAT IS THE MARKET?

What problems do we address?

1. BACTERIA IN THE FOOD VALUE CHAIN

INCREASING FOOD POISONING OUTBREAKS

- Globally increasing demand for fresh unprocessed food.
- Global drive to decrease the use of pesticides and chemical fertilizers.
- Result: dramatic increase in food poisoning incidents - The US Centres for Disease Control and Prevention (CDC) estimates that approximately 80 million Americans contract food poisoning or food borne illnesses annually caused by harmful bacteria, viruses, parasites and/or toxic chemicals.
- Fresh unprocessed products are difficult to sanitise effectively.

THE DECREASE IN FRESH FOOD SHELF LIFE

- Bacteria directly reduces the shelf life of fresh produce.
- Microbial spoilage can be prevented.
- The food services sector carries the brunt of microbial spoilage, with some restaurants' food waste as high as 5% of turnover.

What problems do we address?

REPUTATIONAL DAMAGE

- A restaurant's reputation is its most valuable asset.
- Food poisoning cases have directly resulted in many temporary or permanent restaurant closures.
- KFC in Australia were fined over $8 million when salmonella poisoning caused a family's daughter severe brain damage.
- World renowned Fat Duck restaurant had to be temporarily closed due to a food poisoning scare and suffered an estimated £100 000 loss in revenue, not to mention the reputational damage.
- Mid 2011 *E.Coli* outbreak in Germany which was attributed to infected bean sprouts resulted in 29 deaths and nearly 3 000 people falling ill.

What problems do we address?

2. CHEMICAL CLEANING METHODS

- Fresh produce, fruit, vegetables, uncooked meat, fish and poultry have traditionally been treated with chemical sanitizers such as chlorine-based chemicals and quaternary ammonium compounds (QAC) to remove harmful microbes.
- Chlorine produces toxic by-products (eg. chloramines and trihalomethanes/THM's) that are severely harmful to human health.
- Toxic by-products have a negative environmental impact on flora, fauna and natural decomposition processes when released into water systems and soil.
- This has led to chlorine being banned by the EU under the Directive 2092/91, published and has been enforced since 1st January 2009.
- However, chlorine, is still the most widely used sanitizing method as it is inexpensive and fairly effective.
- Chemical cleaning methods are becoming increasingly ineffective as many harmful strains of bacteria are developing resistance to these chemical compounds.

OUR SOLUTION: OZONE

Ozone is accepted, safe, natural & powerful

ACCEPTED: The US FDA approved the use of ozone as an antimicrobial agent in food in 2001. It has been adopted across many parts of the world.

SAFE: Ozone is deemed safe for use in most of the developed world and there are well documented health and safety guidelines for its use as well as acceptable levels of exposure. NOZ has been designed to be compliant with these safety guidelines.

NATURAL: Ozone (O_3) is naturally occurring and arises when an additional oxygen atom is added to existing oxygen molecules (O_2).

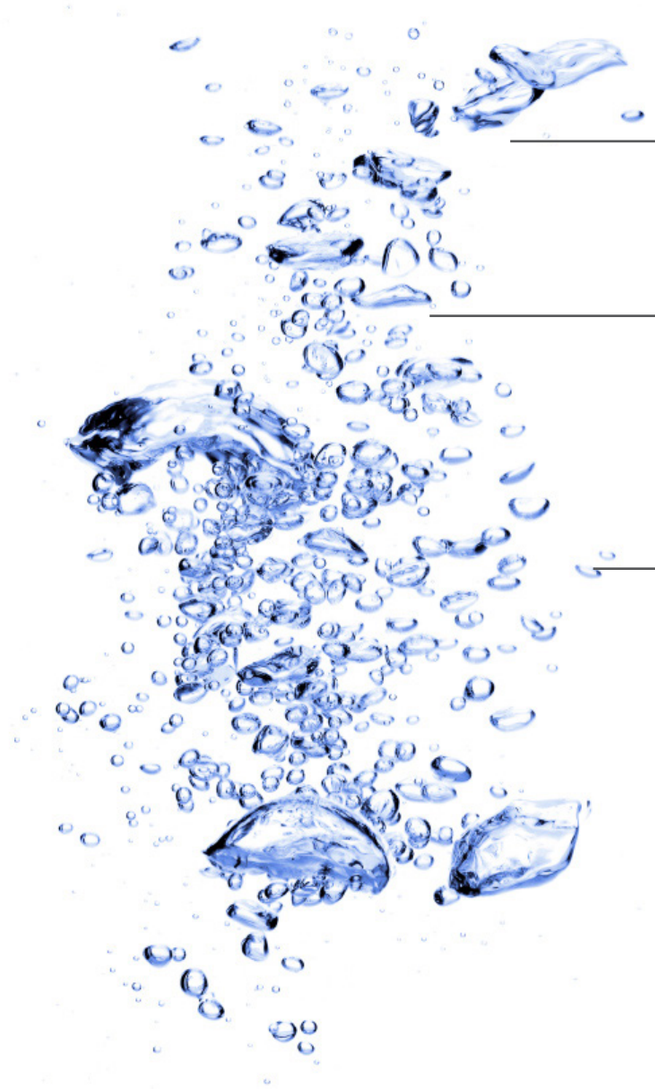
POWERFUL: Ozone is a powerful antimicrobial agent as it rapidly oxidises organic molecules, reverting to natural oxygen.

WELL DOCUMENTED: Substantial research has proven Ozone's properties.

WHAT HAS PREVENTED MARKET ADOPTION OF OZONE BASED DEVICES?

Current Ozone Systems

The majority of professional systems use venturis to produce bubbles of ozone and rely on the ***absorption*** of the ozone into the water. This results in ozone simply sanitizing the water. Unabsorbed ozone escapes into the atmosphere, making it unsafe for the user.



Escaped ozone gas is a hazard and wasteful

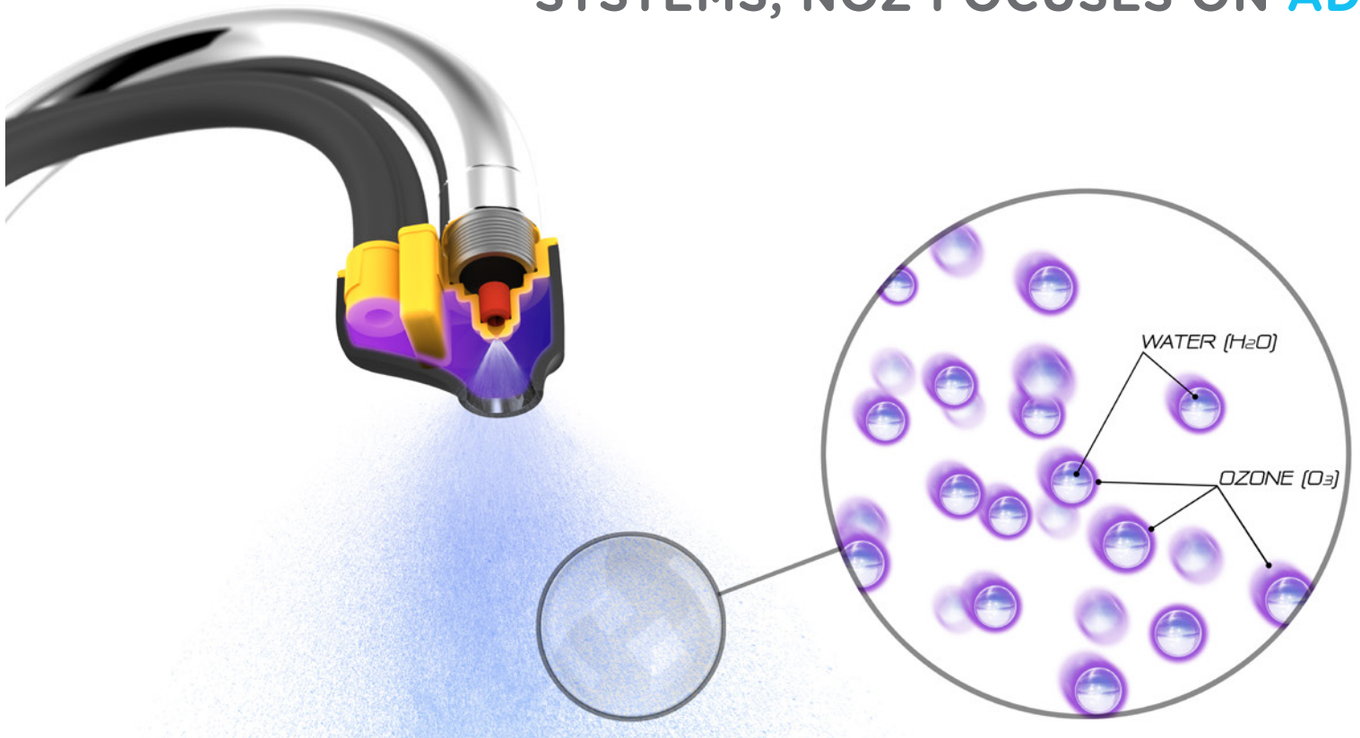
Water quality needs to be high with a low organic content or ozone is used in sanitizing the water

Ozone pumped into the water via a venturi.

NOZ FOCUSES ON **ADSORBTION,** UNLIKE CURRENT ABSORBTION BASED SYSTEMS.

nöz – What is it?

UNLIKE CURRENT ABSORBTION BASED SYSTEMS, NOZ FOCUSES ON ADSORBTION



- Nozzle breaks water flow into a mist of water droplets.
- **ADSORPTION** of the ozone onto the water droplets.

ArcAqua has two patents covering this innovative process.

nöz – What is it?

ADSORPTION ADVANTAGES

- Water and ozone are fed into the NOZ simultaneously.
- The patented nozzle breaks up the water into small droplets.
- The water's massively increased surface area is used to **ADSORB** the ozone and deploys it to the item, effectively sanitizing it in less than 10 seconds.

ADSORPTION IS THE ADHESION OF MOLECULES TO THE SURFACE OF A SOLID OR LIQUID

The NOZ system is not affected by water quality, because of low levels of absorption improving the effectiveness of the process. Furthermore, the unique design prevents ozone from leaking into the atmosphere, making it safe to use.

The benefits of nöz

1. ELIMINATES 99.9% OF ALL KNOWN BACTERIA

- Innumerable scientific studies have proven ozone's potent antimicrobial activity.
- Ozone effectively kills viruses, bacteria, fungi, and parasites, including those causing food spoilage and human illnesses.
- Tests have shown that ozone's powerful sanitation properties are effective not only on fresh produce but fish, poultry, meat and equipment.

"OZONE IS MORE THAN 300 TIMES MORE POWERFUL A DISINFECTANT THAN CHLORINE."

- use of ozone in food processing & cold storage (2002)

The benefits of nöz

1. ELIMINATES 99.9% OF ALL KNOWN BACTERIA

Results			
WHOLE TOMATOES	*E. coli*	*E. coli 0157:H7*	*C. albicans*
BEFORE WASHING	92 000 000	20 000 000	150 000 000
AFTER NOZ WASH (10 sec)	<1	<1	<1
% KILL RATE (10 sec)	=99.99%	=99.99%	=99.99%

The benefits of nöz

2. MORE EFFECTIVE, SAFER, SANITIZATION

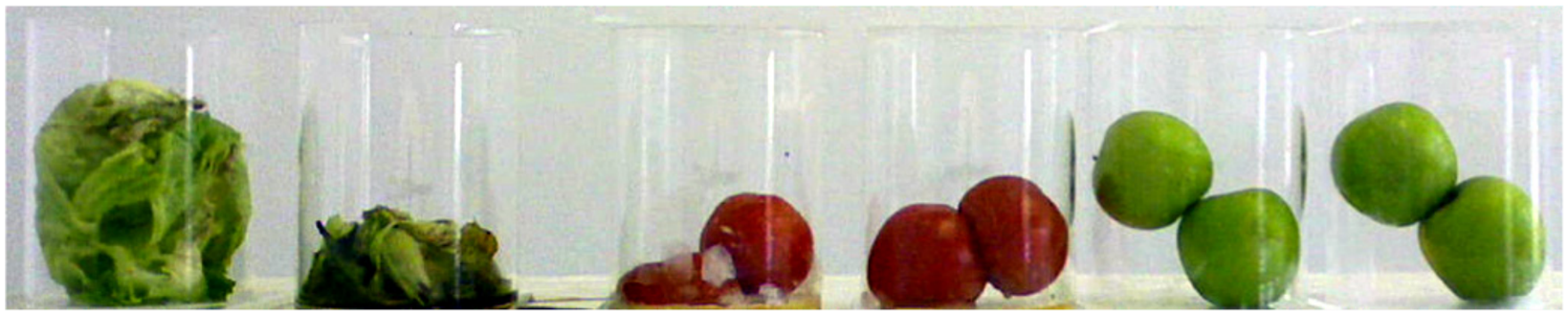
- The patented design and sensing system makes NOZ safe and effective.
- A sensor and micro-controller in the nozzle measures exactly how much water is flowing through the system and can adjust ozone production accordingly.
- The ozone-coated water is then deployed to the item where the mechanical action of the water removes any large particles, allowing the ozone to sanitise the item, killing off all unwanted microbes.

The benefits of nöz

3. EXTENDS SHELF LIFE

- In a recent study by the World Academy of Science, Engineering and Technology, there was a 50% improvement in the shelf life of ozone treated fresh produce.
- Arc Aqua's investigations confirm the above results, when fresh NOZ treated and untreated produce was left unrefrigerated for a period of 2 weeks, as demonstrated below.

OZONE SANITIZED PRODUCE:



The benefits of nöz

4. ENVIRONMENTALLY FRIENDLY

- Current chemical based sanitizing methods are becoming ineffective as bacteria mutates. Consumers are increasingly demanding ‘green’ alternatives.
- NOZ produces only the ozone that is needed, uses minimal water and electricity and once the microbes are removed. The ozinated “effluent” water is safe to be flushed into municipal drains - providing better wastewater quality that contains additional oxygen, assisting biological wastewater treatment.

nöz Field Trials

WE KNEW:

- Ozone was effective - it is nature's sanitizer.
- NOZ was effective - laboratory tests proved that conclusively.

BUT WE NEEDED TO KNOW IT WORKED IN REAL LIVE SITUATIONS

WE COMMISSIONED 7 WEEKS OF FIELD TRAILS TO:

Get a quantifiable baseline for NOZ effectiveness

- as an antimicrobial device – effectiveness in destroying bacterial levels;
- as a commercial device to quantify food wastage savings;
- as a commercial device to quantify chemical and water savings.

Get valuable insights into deployment and operations

- testing and perfecting installation procedures;
- validation of operational parameters – water pressures, O_3 levels;
- clarity and feedback on ease of use from in-store staff.

To provide the operational proof, we required legitimate results and appointed:

CatalytIQ Consulting (Pty) Ltd

& **Food Consulting Services (Pty) Ltd**

Field Trial Protocol

OPERATIONAL TESTING BY CATALYTIQ CONSULTING (PTY) LTD

QUANTITIVE ASSESSMENT

- Device testing, ambient ozone, temperature; and
- Humidity level testing;
- Food wastage;
- Water and chemical savings.

QUALITATIVE ASSESSMENT

- Impact on staff and management.
- Impact on kitchen operations.

MICROBIAL TESTING BY FOOD CONSULTING SERVICES (PTY) LTD (SANAS ACCREDITED LABORATORY)

MICROBIAL TESTING OF SPECIFIED FOOD TYPES AND EQUIPMENT

Nature of Tests:

- Standard plate count (TM 006)
- Yeast & mould enumeration (TM 015)
- Coliforms (eg *Ecoli*) (TM 022)

FIELD TRIAL SIZE

13 sites in total

- 3 different types of restaurant and two hospital kitchens
- 4 control sites

nöz Microbial Efficacy

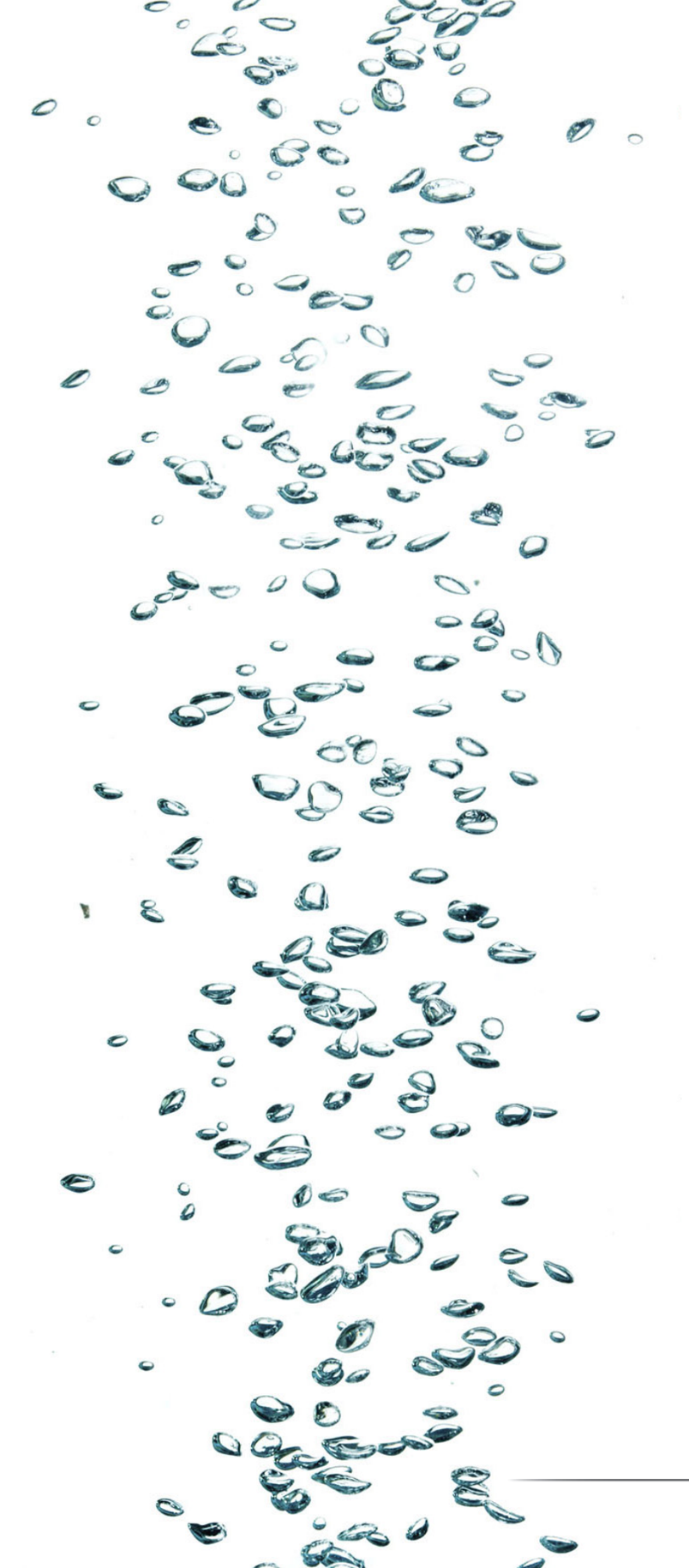
FIELD TRIAL PROCESS:

- Swab test collection times were unannounced,
- Swab tests taken prior to installation of NOZ at all sites week 1,
- Swab tests taken every two weeks,
- Week 6 NOZ removed.

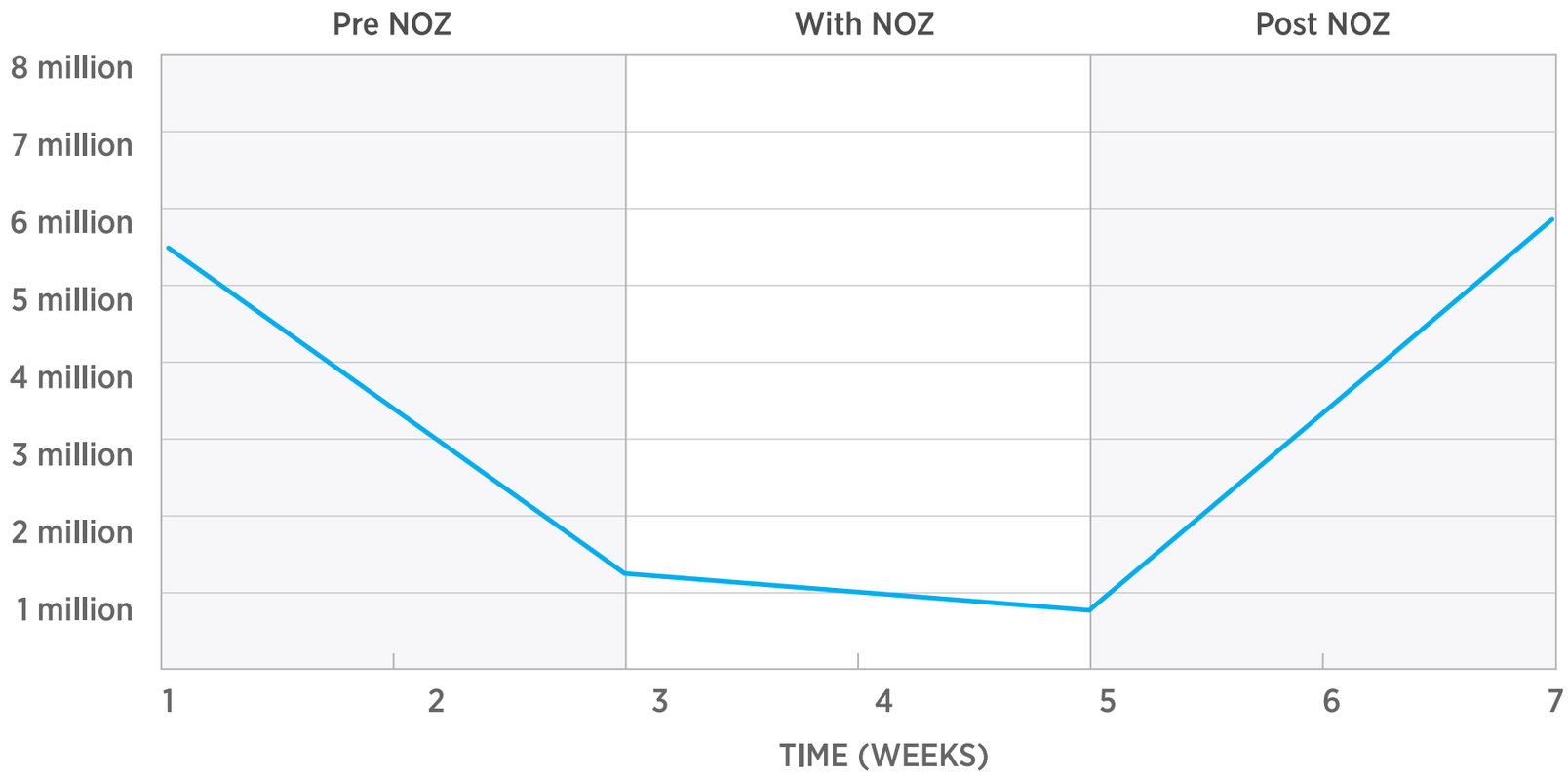
Note:

- The control sites continued to use normal chemical sanitizers.
- The results are aggregated results from all the sites.

A TOTAL OF 305 MICROBIAL TESTS AND 145 FOOD SAMPLE TESTS WERE PROCESSED BY FCS OVER 7 WEEKS



Microbial Field Trial Results



THE OBSERVED RESULTS

CONTROL SITES

- Improved during trial period;
- Improvement ascribed to monitoring process;
- Control sites chemical sanitizers not as effective as NOZ.

Microbial Field Trial Results

TRIAL SITES

- Immediate improvement from date of NOZ installation.
- Continued to improve through to week 6.
- Bacteria count rocketed after removal of NOZ – week 6.

NOZ IS 2 TO 3 TIMES MORE EFFECTIVE THAN CONVENTIONAL CHEMICAL SANITIZERS DURING THE FIELD TRIAL

THE MICROBIAL FIELD TRIALS CLEARLY INDICATE NOZ'S EFFECTIVENESS.

Efficacy Lab Testing

CUTTING BOARD	*E. coli*	*S. aureus*	*Salmonella*	*Pseudomonas*	*L. monocytogenes*	*E. coli 0157:H7*	*C. albicans*
BEFORE WASHING	92 000 000	20 000 000	190 000 000	16 000 000	280 000	20 000 000	150 000
AFTER NOZ WASH (10 sec)	<1	<1	<1	<1	<1	<1	<1
% KILL RATE (10 sec)	=99.99%	=99.99%	=99.99%	=99.99%	=99.99%	=99.99%	=99.99%

Microbial Field Trial Results

QUANTITIVE ASSESSMENT

FOOD WASTAGE

- Different sites had different levels of maturity in terms of wastage awareness.
- Some sites fastidious in recording – others less so or not at all.
- Where good records were kept wastage could be mapped objectively.
- Significant wastage reduction of > 30% observed.
- Substantial post-test wastage observed (up more than 100% after unit removed - indicating reliance on NOZ effects.

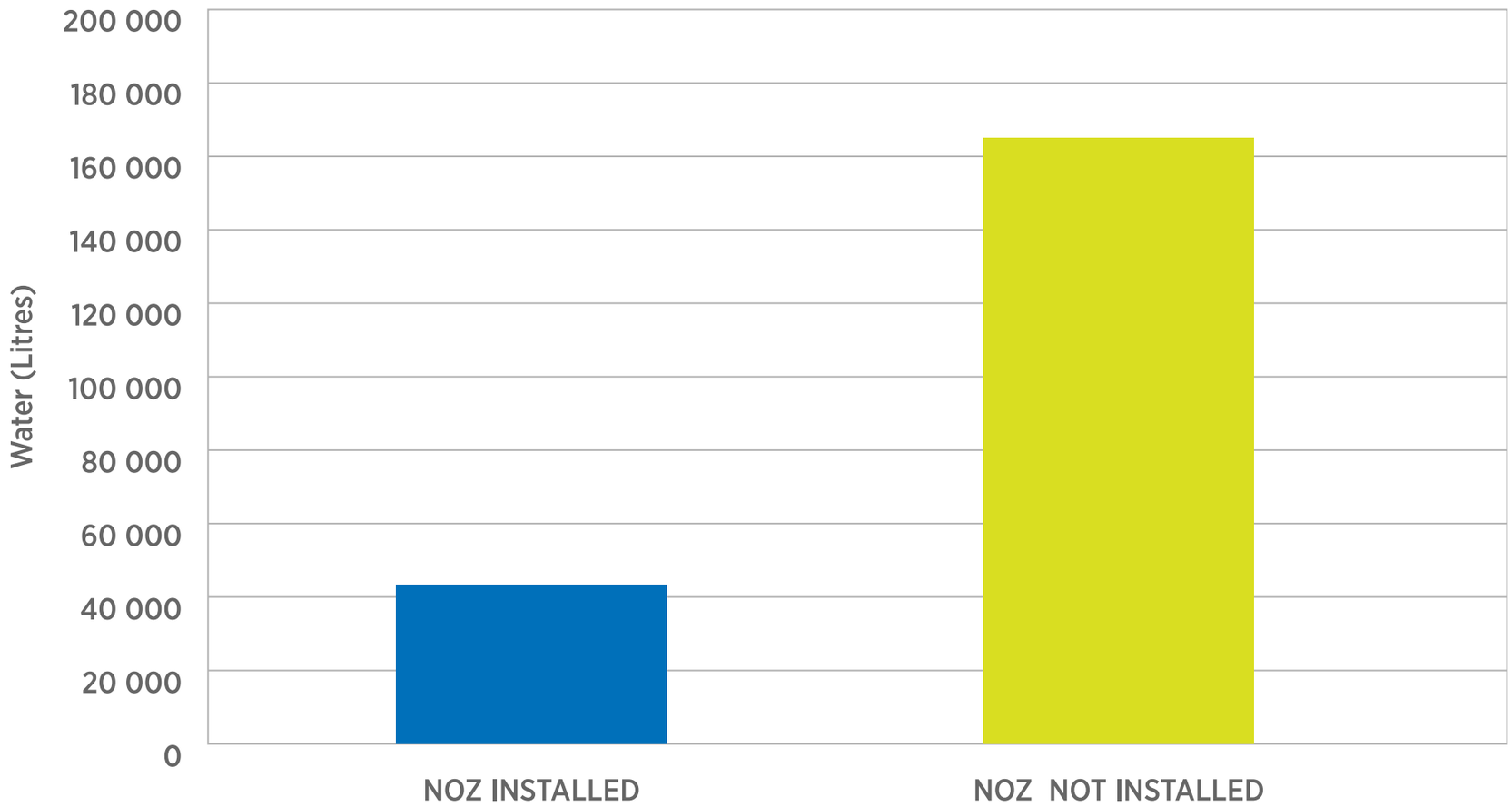
CHEMICAL USAGE

- Only one site monitored in detail.
- Mapped back to usage records before, during and after trial.
- Reduction in chemical sanitizer usage.

WATER USAGE

- Water usage in the NOZ ECU.

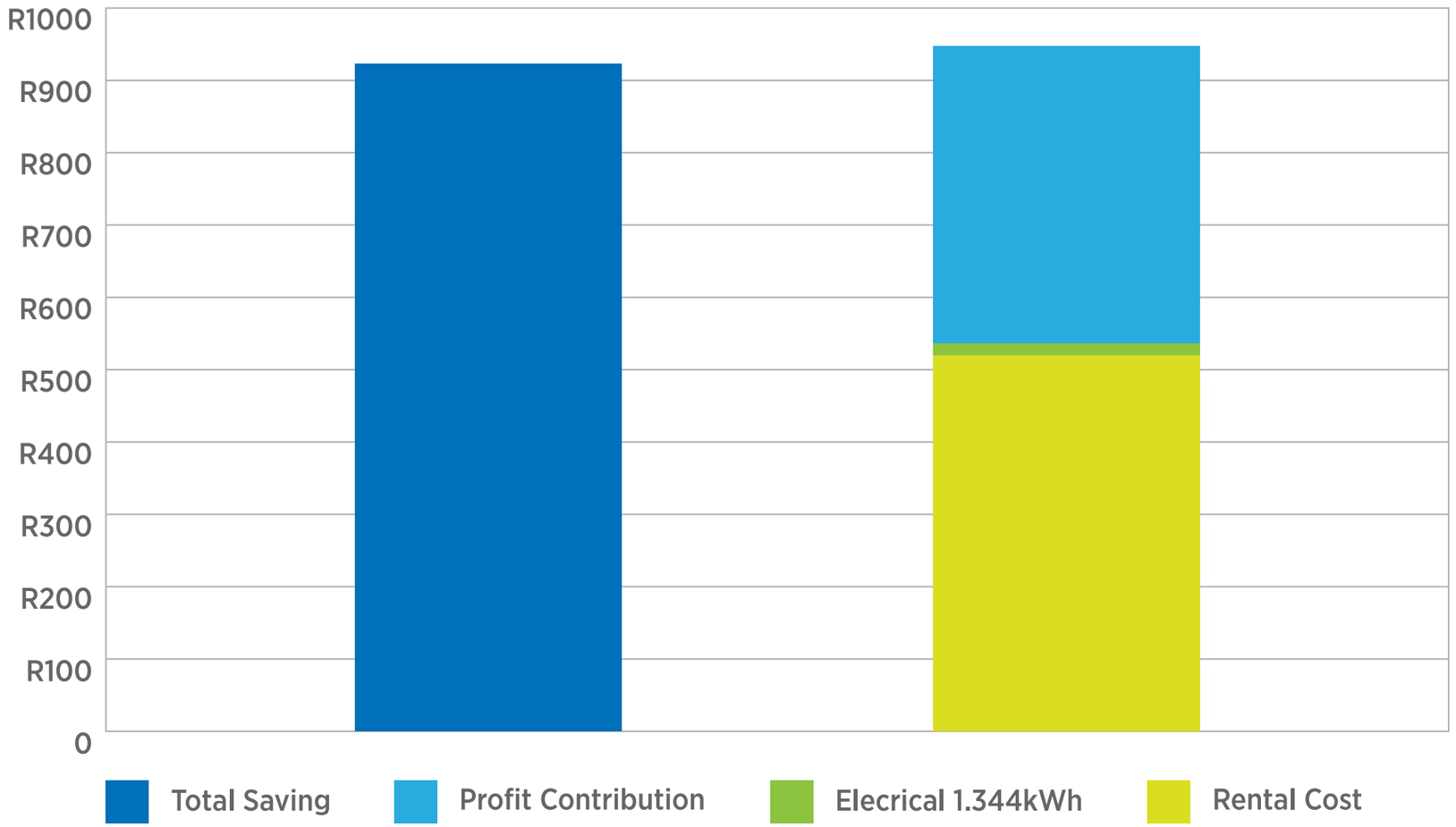
Microbial Field Trial Results



Microbial Field Trial Results

NOZ QUANTITATIVE SAVINGS PER MONTH WERE MORE THAN DOUBLE THE RENTAL COST PER MONTH

SAVING GRAPH



Qualitative Assessment

In addition to prolonging the shelf life of the products, what else did they feel the NOZ was useful for?

ANSWERS FROM VARIOUS SITES

"HAPPY" - (food prep employee) cut out a number of sanitizing steps in having the device – this saved time.

" RELIEF"- no worry that the taste of the food was changed by the cleaning product.

" ONLY" - ordered 1 device as they don't have a 3rd tap for fast flowing water.

" REALLY" - the kitchen and equipment seemed cleaner (and now seems dirtier without it).

WOULD THEY RECOMMEND THE DEVICE TO OTHER SHOPS?

YES

One trial participant has installed noz units in all ten of his stores!

nöz Simplicity is the key!

INSTALLATION

We've reduced installation to an extremely simple process:

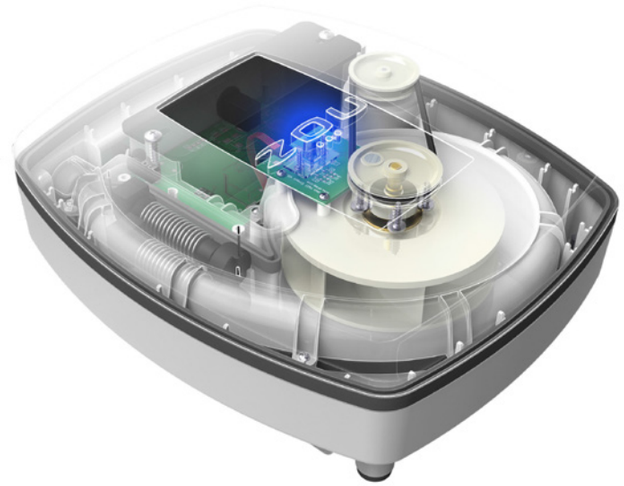
- Drill two holes above the tap height.
- Connect the nozzle to the tap.
- Connect the ozone deployment hose from the nozzle to the unit.
- Finally, plug the transformer into the wall socket and connect to the unit.
- That's it!! You're ready to save money and deliver cleaner, better smelling and tasting fresh food produce!

OPERATION

This is even simpler! All the user needs to do is rinse an item that needs to be sanitized, to remove the microbes and extend the shelf-life.

COMPLIANCE WITH STANDARDS

The system has been designed to comply with International Safety Standards and carries the CE.



- **Simple to install**
- **Simple to use**
- **Good looking platform**
- **Highly effective in operation**

nöz A Summary

WHAT'S SPECIAL ABOUT NOZ?

- Effectiveness and clear value proposition.
- Low cost compared to the alternatives.
- Innovative approach to sanitisation.
- Simplicity.