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## Water and wastewater management in the red meat abattoir industry



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**Internationally, red meat abattoirs are known to be high volume water consumers. Similarly they are also serious polluters of wastewater. The increasing demand of domestic water consumers, and the limited supply of water in a semi-arid South Africa focuses the attention on high volume industrial consumers to assist in reducing water consumption. This national survey (the second to be undertaken in the industry since the 1980s) places the spotlight on water use and wastewater management in the abattoir sector.**

### Introduction

The abattoir industry is responsible for the conversion of livestock to edible meat. This process remains critical to ensure a safe and wholesome product to consumers. The Meat Safety Act (Act no. 40 of 2000) addresses measures to promote the safety of meat and animal products and to establish and maintain essential national standards in respect of abattoirs.

The red meat abattoir industry is internally renowned to be a high water consumer, with intense wastewater production. The quantity of water used in red meat abattoirs is linked to the number of animals slaughtered. For ease of use, a comparative measure, namely 'slaughter unit' (SU), was developed, which enabled the simultaneous monitoring of the three species (cattle, sheep, pigs) that are generally processed in these abattoirs.

The number of abattoirs in South Africa has increased dramatically since the previous survey was undertaken (1989) from 285 officially registered abattoirs to 432. In all nine South African provinces, the 'smallest' category (2 -20 SU capacity) of abattoirs has proliferated, and 49.8% of the total slaughter capacity is based on these small size abattoirs.



*There around 432 registered abattoirs in South Africa.*

### Water use

Water is used in practically all the processing areas, either for washing down, cleansing or sterilising purposes.

The red meat abattoir industry consumed an estimated 5.8 million m<sup>3</sup> of water annually in 1989. This was extrapolated to a 2014 value of 8.8 million m<sup>3</sup>, of which 82% is discharged as wastewater. The water consumed per SU increases inversely to the abattoir slaughter capacity – small abattoirs processing between 20 and 50 SU per day uses much more water

than their larger counterparts. This is due to the fact that larger abattoirs are more cost-conscious, and manage their expenditure better.

In a single abattoir, water consumption varies greatly between different processing areas. The largest water consumers are the stunning/bleeding, main process and rough offal preparation areas.

**Table 1. Water consumption in red meat abattoirs**

Abattoir capacity	Water consumption		
	Maximum	Average	Minimum
> 100	0.50	0.91	2/05
50-100	0.28	1.04	2.08
20-50	1.48	2.04	2.60



*The abattoir industry uses huge volumes of water for cleaning and wash-down purposes.*

### Wastewater generation

Approximately 82% or 7.2 million m<sup>3</sup> of freshwater consumed, is discharged as wastewater, containing a high organic load (COD), varying in range from approximately 730 mg/L to 9 930 mg/L. The wastewater quality emanating from red meat abattoirs depends, to a great extent, on the size of the operation. Typically, raw blood generates exceptionally high COD levels, while cleaning and carcass washing operations normally account for more than 80% of total water use and wastewater volume.

### Best practice in water use and wastewater management

The ever increasing cost of potable

freshwater as well as wastewater treatment cost increases the pressure on red meat abattoirs to reduce water consumption and wastewater generation.

It is possible for red meat abattoirs to adopt a systematic approach to minimising water use and reduce their water and wastewater costs by 15-30%. In smaller abattoirs water use can be reduced by as much as 60%, at little to no cost to business.

Many abattoirs can significantly improve both process and cleaning operations. The aim should be to minimise waste generation, and systems should be put in place to:

- Reduce water consumption
- Minimise quantities of waste generated
- Minimise spillages
- Remove solids before entering waste streams
- Institute dry-cleaning regimes prior to wash-down

Strategies should therefore be institute to facilitate cleaner operational procedures, minimise and/or prevent waste generation, properly dispose of waste, recycle waste or institute waste beneficiation systems, which should include:

- Effective management of water utilisation and the accompanying generation of wastewater
- Implementation of system improvements
- Water conservation

The final report of this WRC project provides various methods with which abattoirs can begin to address their water use and wastewater management.

### Further reading:

*Natsurv 7: Water and wastewater management in the red meat abattoir industry (Edition 2) (Report No. TT 701/16)*. To order the report contact Publications at Tel: (012) 761-9300; Email: [orders@wrc.org.za](mailto:orders@wrc.org.za) or Visit: [www.wrc.org.za](http://www.wrc.org.za)