

## STAPHYLOCOCCUS AUREUS HARBOURING blaZ IN THE MILKING ENVIRONMENT.

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### INTRODUCTION

The blaZ gene expression determines resistance to beta-lactams and characterises the production of penicillinases/beta-lactamases, enzymes which are responsible for inactivating beta-lactams, which are a group of antibiotics, consisting of penicillins, including methicillin, cephalosporins, cephamycins, monobactams and carbapenems. The frequent use of antibiotics to treat bovine mastitis caused by *S. aureus* contributes to the development of this pathogen's resistance, as does as the human missuse of these substances. Related genes are easily transferred to other microorganisms that are present in humans and animals, so the aim of this work was to evaluate the presence of antibiotic resistance by considering the blaZ gene in *S. aureus* obtained from the milking environment of dairy farms in a rural zone of a municipality of Paraná, Brazil.

### METHODOLOGY

A total of 122 samples, including water and (when available) wastewater samples, samples of raw milk from bulk tanks, and swabs of milkers' hands, cows' udders, milking equipment, and utensils, were collected from 12 family-owned dairy farms in the metropolitan region of Curitiba, PR, Brazil. The municipality has 329 058 inhabitants and houses 7991 bovines in a total area of 946.4 km<sup>2</sup>. All samples were cultured in Baird Parker Agar enriched with an egg yolk emulsion. The determination of the genotypic resistance of *S. aureus* was achieved by Polymerase Chain Reaction (PCR) for amplification of the blaZ gene and through the Kirby Bauer test for penicilin.

### RESULTS

A total of 23 samples showed coagulase-positive *Staphylococcus* counts, predominantly in milk samples (10/12), followed by hand swabs (5/24), udder swabs (4/24), wastewater (2/2), equipment swabs (1/24) and sieve swabs (1/24). All water samples showed  $\leq 100$  CFU/ml for the microorganism. Seven properties showed some type of resistance to the antibiotics tested, and milk samples were tested for four of these properties. Genotypic and phenotypic resistance was detected in three of these milk samples, while phenotypic resistance without a genetic finding was detected in one. In one sample, despite the genetic finding, resistance expressed phenotypically was not observed and in another, phenotypic but not genetic resistance was observed. One teat tested positive for the gene but was not phenotypically positive and one teat tested positive for the gene but not phenotypically. With

the exception of one farm, where resistance was observed on the hand swab and in the milk sample, resistance to the antibiotics tested was not observed in more than one sample taken from the same farm.

## DISCUSSION

Our findings draw attention to the occurrence of antibiotic resistance on dairy farms, which may be caused by the misuse of these substances by humans.