



# LEIBER BREWERS' YEAST



## THE EFFECT OF LEIBER BREWERS' YEAST (*SACCHAROMYCES CEREVISIAE*) ON THE ADHESION OF *E. COLI* AND *SALMONELLA TYPHIMURIUM* IN LIVESTOCK FEEDING

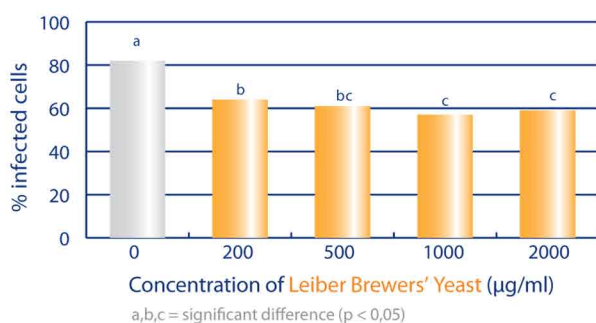
Binding pathogenic bacteria one of the key ways in which brewers' yeast of the *Saccharomyces cerevisiae* variety helps protect the health and well-being of livestock. It is assumed that different bacteria (*E. coli*, *Salmonella*) bind to the brewers' yeast cell walls, which leads to a reduced rate of adhesion of pathogenic bacteria to the intestinal epithelial cells of livestock, thereby improving the animals' health. This assumption was tested in the subsequently described trial.

### Trial design

#### Examination of the adhesive behavior of pathogenic enterobacteria towards IPEC-J2 cells

The *Escherichia coli* strain PS70 and *Salmonella Typhimurium* (DSM 5569) were used in the trial. These strains were attached to IPEC-J2 cells at a rate of  $10^4$  cells/ml. The IPEC-J2 cells were from a permanent cell line isolated from the jejunum of pigs (Berschneider, 1989). The relative rate of epithelial cells associated with fluorescent bacteria was determined using CellQuest (Becton Dickinson Bioscience, San Jose, USA) software's flow cytometric analysis. A scatterplot was then used to determine the relative rate of epithelial cells associated with *E. coli* and *Salmonella*, respectively. All tests were conducted over three days and repeated three times on each trial day.

Figure 1: Adhesion of *E. coli* PS79 to porcine IPEC-J2 cells



### Results

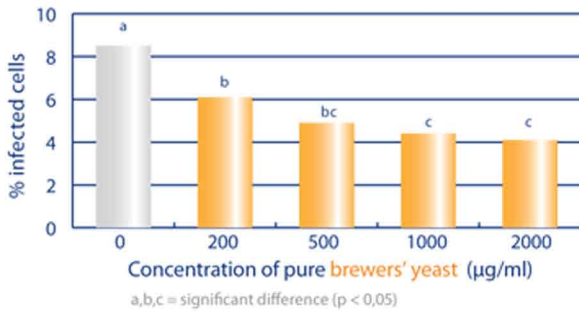
#### Adhesive behavior of *E. coli* PS79

The trial showed a concentration-dependent inhibition of the adhesion of the pathogenic *Escherichia coli* strain PS79 (Figure 1).



# LEIBER BREWERS' YEAST

Figure 2: Adhesion of *Salmonella Typhimurium* to porcine IPEC-J2 cells



Figures 3 and 4 show the relative reduction of adhesion of the *E.coli* and *Salmonella Typhimurium* pathogens to intestinal epithelial cells. A dose-dependent positive impact on the two pathogenic bacteria was observed. Compared to a control group, *E.coli* bacteria were reduced by over 30 % and *Salmonella* by more than 50 %. This can be explained by the two pathogens' different mechanisms: While *E. coli* uses adhesive mechanisms to bind to and harm the intestinal walls, *Salmonella Typhimurium* uses invasive mechanisms.

### Adhesive behavior of *Salmonella Typhimurium*

Trials with the used strain of *Salmonella Typhimurium* showed a lower infection rate compared to the trials using *E.coli*. This can be explained with by the two pathogens' different mechanisms.

### Conclusions Leiber Brewers' Yeast



Reduced the number of infected epithelial cells in the intestines of pigs by more than 30 % for *E.coli* and by over 50 % for *Salmonella*.



Showed a dose-dependent inhibition of *E.coli* and *Salmonella*.



Can substantially reduce the risk of infection in intensive livestock production because of its antagonistic effects on *E.coli* and *Salmonella Typhimurium*.

Figure 3: Reduction of adhesion of *E.coli* to porcine intestinal epithelial cells



Figure 4: Reduction of adhesion of *Salmonella Typhimurium* to porcine IPEC-J2 cells

