IMPACT OF A PROBIOTIC YEAST *SACCHAROMYCES CEREVISIAE BOULARDII* ON *CLOSTRIDIUM DIFFICILE* NEONATAL DIARRHEA IN PIGLETS

Alno J.P.[1], Normand V.[1], Delforge J.[2]
[1]vet consultant in pig production, France, [2]Tours University, Animal Production department, France

Introduction

Clostridium difficile is one of the main bacteria responsible for diarrhea in human at the hospital. It is found in number of animal species, including piglet, where it is more and more frequently identified as a cause of neonatal diarrhea (1, 2).

The live yeast *Saccharomyces cerevisiae boulardii* is widely prescribed in humans to prevent *Clostridium difficile* diarrhea.

Several pathways of this specific yeast strain have already been documented in rodents and humans (3):

- production of a 54-kDa protease, which digests toxins A, and B.
- reinforcement of the intestinal epithelial barrier.
- induction of non-toxinogenic *C. difficile* clones.
- enhancing of the mucosal immune response.
- direct action on the toxin synthesis pathway through the release of a vitamin.

In piglets, birth is a critical period. Its digestive tract, sterile at farrowing, is quickly and gradually colonized by a complex microbial population. The impact of *Saccharomyces cerevisiae boulardii* against toxins of *Clostridium difficile* and on clinical signs of neonatal diarrhea in piglets have been assessed in a field trial.

Materials and methods

Description of the products:

The probiotic yeast *Saccharomyces cerevisiae boulardii* (CNCM I-1079), Levucell SB®, is a microbial feed additive authorized by CE n°1436/98.

Tiamuline is used in the prevention of *Clostridium difficile* diarrhea: preventive single injection IM of 0,25cc at birth and repetition as soon as clinical signs were observed.

The post-weaning feed (from day 21) is supplemented with colistine (120 ppm), to prevent digestive disorders.

Experiments and animals:

78 Dalland sows and their 934 piglets were used in the study. The piglets were followed from birth until 42 days of age. Sows were randomly distributed between 3 treatments : Control, Levucell SB® and Antibiotic, for 5 successive groups, through 3 experiments (A, B and C). In experiment A (groups 1 and 2), Levucell SB® was given in a single-dose, *per os* at farrowing by a dosing syringe system. In experiments B (groups 3 and 4) and C (group 5), Levucell SB® was added in sow feed 4 days prior to and 4 days after farrowing. Only group 5 did not receive any Antibiotic. The piglet feed then contained the probiotic yeast from 4 to 42 days of age.

For treatments Control and Levucell SB®, post-weaning feed did not contain any antibiotic.

Measured parameters:

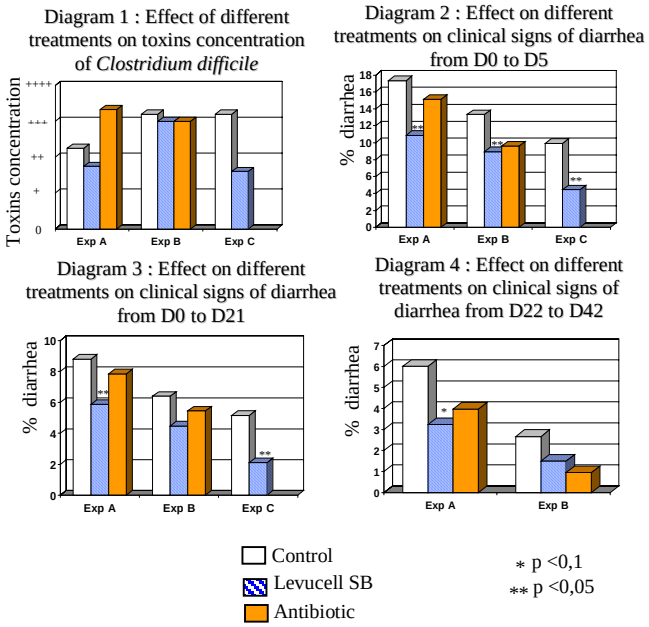
Toxins of *C. difficile*:

Piglet fecal toxin concentration of *C. difficile* was evaluated by an immuno-enzymatic test on day 4: Kit Toxin A/B (Meridian), expressed according to a qualitative scale from 1 to 4.

Diarrhea scores: The animals were observed individually from birth to 42 days of age. Three periods of observation were defined: 0 to 5 days of age (two daily diarrhea scores), 6 to 21 days of age (a daily diarrhea score) and 22 to 42 days of age (a diarrhea score per week on each piglet).

The statistical data were analyzed by SYSTAT® for Microsoft Windows® (Analysis of variance in GLM and Chi-square).

Results and Discussion



Addition of *S. c boulardii* made it possible to appreciably reduce toxin A and B concentrations of *C. difficile* in piglet feces (Diagram 1). This may result from the *S. boulardii* specific protease inhibiting *C. difficile* toxins (3).

In parallel, the clinical signs of diarrhea were less important during time D0-D5 (Diagram 2), D0-D21 (Diagram 3) and in the post weaning period between D22 and D42 (Diagram 4) compared to Control.

Less clinical expression of neonatal diarrhea is reflected at weaning and post-weaning. The rate of relapse in the post-weaning period decreased and future performance was better (4).

The benefit of *S. c. boulardii* on digestive disorder reduction in the suckling period can also be due to a reinforcement of the digestive mucosa and local immunity (5).

This study falls under an exploratory step by highlighting interesting effects on digestive hygiene in piglets. The use of *S. c. boulardii* earlier in the animal's life contributes to protection from intestinal disorders, for example due to *C. difficile*, while preserving beneficial effects of growth in the animals.

Additional microbiological and histological research will provide more evidence for a better comprehension of the phenomena.

1 - Yaeger Michael, 2001. J Vet Diagn Invest. 14(4):281-7.
2 - Songer J. G., 2000. Swine Health and Prod. 8:185-189.
3 - Czerucka et al., 2002. Microbes Infect. 4(7):733-9.
4 - Wagner M., 1999. Conf. for Practitioners, p. 165-168.
5 - Di Gian Camillo A., 2003. DPP, Canada. Vol 2, p 262-265