



## Effect of Brewers' Yeast Beta-Glucan Supplementation on Immune Parameters in Horses

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Respiratory infections such as bronchitis or equine influenza, skin diseases like sweet itch or mallenders or even wound healing disorders – the immune system is constantly exposed to attacks from viruses, bacteria, fungi or parasites. If the immune system is weakened, the horse is more susceptible to infections, falls ill more often and takes longer to recover. In the worst case, diseases can even become chronic.

For all horses and ponies, a strong immune system is the most important natural protection and defence system. Therefore, a natural strengthening of the immune system is of great interest to every horse owner. The stronger the immune defence, the lower the risk that the horse will fall ill.

Brewers' yeast beta-glucans are since years well-known for their positive immunostimulatory and immunomodulatory effects, which have been successful proven many times in various human and animal studies. But there are less informations about using beta-glucans in horses.

The purpose of this study was to identify the influence of **Leiber® Beta-S**, a high purified brewers' yeast beta-glucan, on different immune parameters in horses.

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### Material & Method:

Four healthy Polish sport horses (500 kg) participated in this study. All live on a horse farm in Rieczna (Poland) and had the same feed and daily work. For a period of 21 days **Leiber® Beta-S** was mixed with a standard horse feed, in different dosages:

- Horse C: 2 g/day **Leiber® Beta-S**
- Horse J: 5 g/day **Leiber® Beta-S**
- Horse A: 10 g/day **Leiber® Beta-S**
- Horse S: control, without test product

Serum blood was taken before administering the preparation (day 1) and on day 7, day 14 and day 21 during administration of **Leiber® Beta-S**. Additional samples were taken seven days after last application of **Leiber® Beta-S** (day 28), to see kineting of immune answer without feeding. The kinetics of changes in the immune parameters of lysozyme, ceruloplasmin, total protein and gamma globulins were measured in the serum blood of horses. The study was done with the Department of Microbiology and Clinical Immunology, Faculty of Veterinary Medicine, University of Warmia and Mazury in Poland (Prof. A. K. Siwicki, 2021).

### Results:

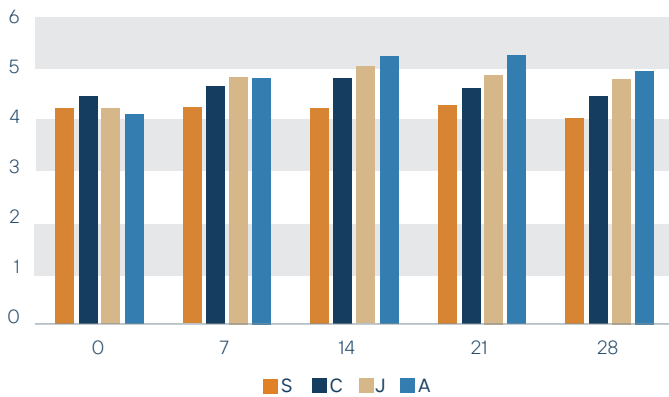
The analysis of the obtained results clearly showed that the administered doses of **Leiber® Beta-S** had a positive effect on different immunological parameters.

#### A. Lysozyme:

Lysozyme is an enzyme found in the blood, which has an anti-bacterial effect especially on gram-positive bacteria. Lysozyme is produced in the blood from neutrophil granulocytes and macrophages. It belongs to the humoral defence mechanisms of the non-specific immune system. So changes in lysozyme activity thus serve as evidence for positive changes in the non-specific immune system.

Already on the seventh day after the administration of **Leiber® Beta-S** an increase in the activity of lysozyme was shown (see Fig. 1) in all dosages. The contents continued to rise visibly, on the day 14 and 21. A dose-dependent effect could be observed. After seven days without the addition of Beta S (day 28), the lysozyme level tends to drop. **Leiber® Beta-S** shows a positive immunostimulatory influence on the non-specific immune system.

**Fig. 1: Lysozyme activity**



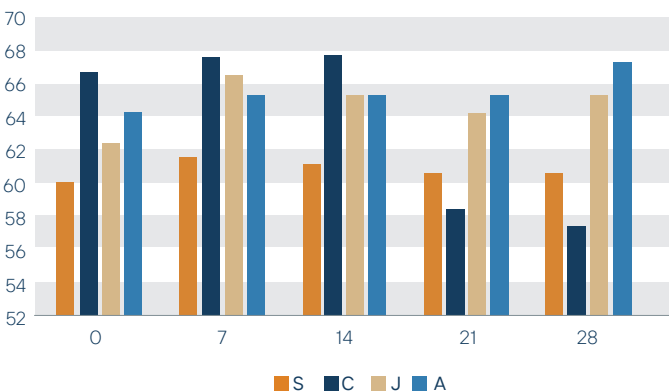
S – Horse (control), C – Horse (2 g/day Leiber® Beta-S), J – Horse (5 g/day Leiber® Beta-S), A – Horse (10 g/day Leiber® Beta-S)

**B. Ceruloplasmin:**

Ceruloplasmin is an acute phase protein. Among other things, it inhibits the formation of free oxygen radicals in the blood. Ceruloplasmin is part of the non-specific immune response and prevents the spread of inflammation. The concentration in serum is increased during inflammation, infection and trauma. So every horse has individual levels of ceruloplasmin in the blood (see Fig. 2).

It seems Horse C is dealing with an inflammation from the beginning (day 0), which was reduced during the feeding of **Leiber® Beta-S** and also one week later without feeding. On the other hand an acute phase reaction can be triggered also systemically. Cytokines, which are released e.g. through macrophages, granulocytes and lymphocytes, serve as messengers. So it is typical that during the first days after feeding the level for Horse A and Horse J slightly increased because e.g. the macrophages react on the immune stimulation and prepare the first defence line.

**Fig. 2: Ceruloplasmin activity**

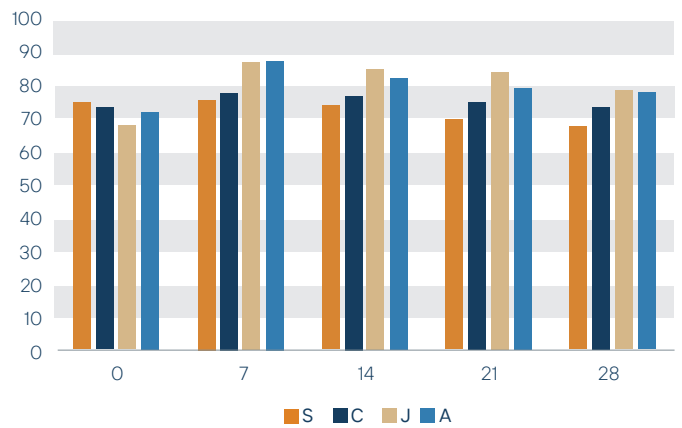


S – Horse (control), C – Horse (2 g/day Leiber® Beta-S), J – Horse (5 g/day Leiber® Beta-S), A – Horse (10 g/day Leiber® Beta-S)

**C. Total protein:**

Total protein measures the total amount of albumin and globulin. They function e.g. as transport proteins for various substances, like hormones but also e.g. gamma globulins serve soluble antibodies. Already on the seventh day after the administration of **Leiber® Beta-S** in all dosages an increase in total protein was shown (see Fig. 3). After seven days without the addition of the test product, total protein tends to drop. It is typical that the values fall slowly, because the immune system of the horses did not meet any pathogen or virus during feeding **Leiber® Beta-S**.

**Fig. 3: Total protein content**

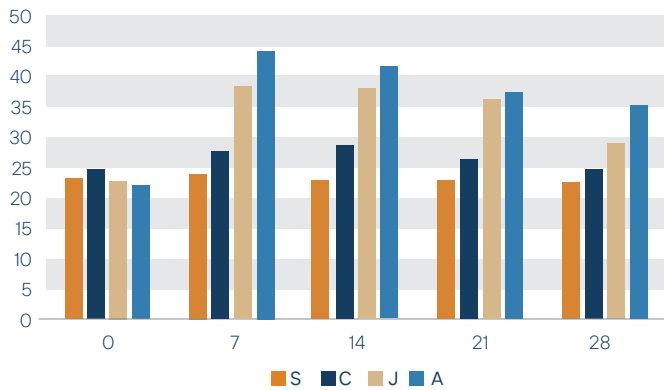


S – Horse (control), C – Horse (2 g/day Leiber® Beta-S), J – Horse (5 g/day Leiber® Beta-S), A – Horse (10 g/day Leiber® Beta-S)

**D. Gamma globulin:**

Gamma globulin is very important for activation specific humoral defence mechanisms. The antibodies (immunoglobulins) of class G, act mainly against viruses and bacteria. They are produced by B lymphocytes or plasma cells after contact with an antigen. So gamma globulin is a marker for the specific immune system and an increase shows an immunostimulatory effect. After application **Leiber® Beta-S**, there was a direct, strong and dose-dependent immune reaction. The task for immunoglobulins is to mark the targets and making them more attackable for further defence systems. After the immune system of the horses did not meet any pathogen during feeding **Leiber® Beta-S**, gamma globulins typically dropped down slowly. This reaction is very positive and suggests that **Leiber® Beta-S** applied by feed increases the specific humoral defence mechanism in horse.

Fig. 4: Gamma globulin level in serum



S – Horse (control), C – Horse (2 g/day Leiber® Beta-S), J – Horse (5 g/day Leiber® Beta-S), A – Horse (10 g/day Leiber® Beta-S)

The obtained results suggest that **Leiber® Beta-S** has a stimulating effect, especially on non-specific cellular and humoral defence mechanisms on the immune system of horses. The highest levels of activity were observed at the dose of 5 and 10 g/day.

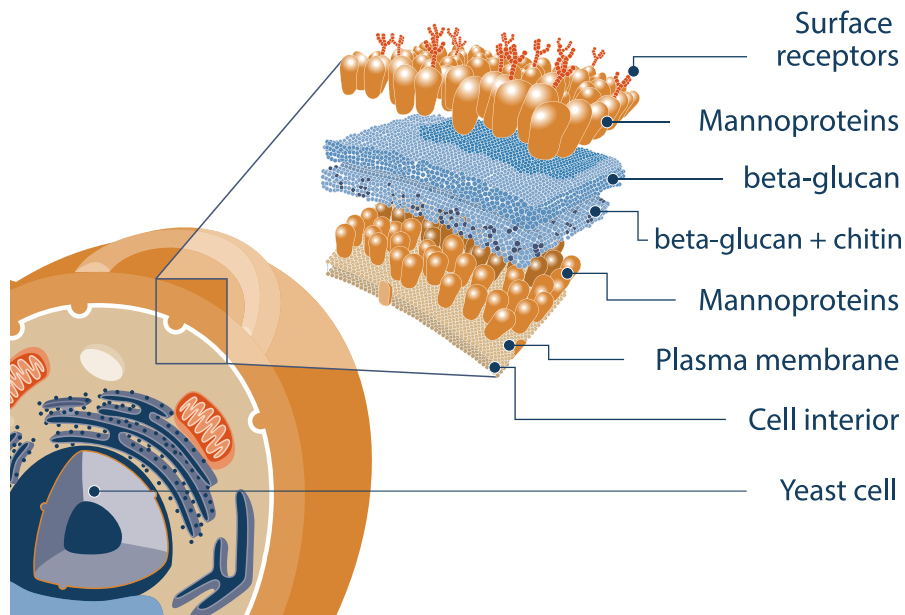
### Take-home message:

#### Supplementing of Leiber® Beta-S:

- increased already seven days after feeding lysozyme activity, total protein, gamma globulin and ceruloplasmin, in all dosages.
- showed a significantly high activity of lysozyme and gamma globuline seven days after feeding compared to the baseline values before feeding, for 5 and 10 g/day.
- showed the highest increase for lysozyme, total protein and gamma globulin on day 14 and 21, with 5 and 10 g/day.
- has an immunostimulatory effect on non-specific and specific defence mechanisms.

Administration of **Leiber® Beta-S** can aid and strengthen the immune system of horses.

Fig. 5: Schematic representation of brewers' yeast cell wall components



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