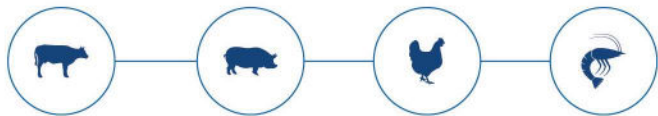


Hilyses[®]

THE BIONIC PREBIOTIC



The key benefits of Hilyses[®] and how to use it effectively

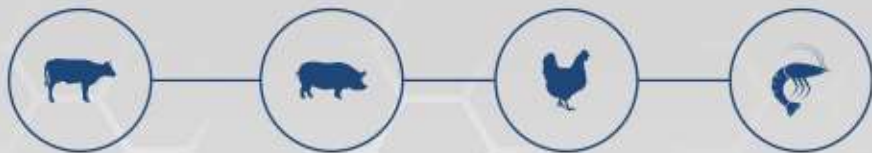
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 **ICC** | **25**
Adding value to nutrition | years



Hilyses 

THE **BIONIC** PREBIOTIC



Adding value to nutrition

Every ICC Brazil product is also made of ImmunoWall®



ImmunoWall® is our yeast cell wall that undergoes a rigorous fermentation conditions process. To survive this harsh environment, ImmunoWall® original cells forge tougher and thicker cell walls, many times denser than those from conventional yeast fermentation.



The atypical and challenging fermentation environment creates a yeast cellular adaptive response leading the β -glucan concentration to become much higher while the fat concentration is sharply reduced.

A protective shield is born from as stress response of the yeast to its growth media!



The result is the highest concentration of yeast cell components for multiple uses in the animal gut.



Our "ImmunoWall® Inside" stamp is the evidence that all ICC Brazil products are carrying the most efficient and resistant cell wall of the market!

Only ImmunoWall® has the thickest, denser cell wall, packed with the most β -glucans and MOS, crucial ingredients to win the battle for intestinal health.

The key benefits of Hilyses[®] and how to use it effectively.

Exploring the differences between competitive yeast products:

- ✓ Yeast Cultures.
- ✓ Autolyzed Yeast.
- ✓ Hydrolyzed Yeast and Yeast Extracts.



Purpose

- ✓ The purpose of this presentation is to provide a semi-technical understanding of the various yeast products offered to and used by the feed industry.
- ✓ We will not deal with animal research and product efficacy, but merely describe what the products are and the benefits they are purported to provide.
- ✓ Feed industry professionals can not afford to take the attitude that "yeast-is-yeast", because there are significant differences in the various yeast products.
- ✓ **Not all yeast products are the same.**



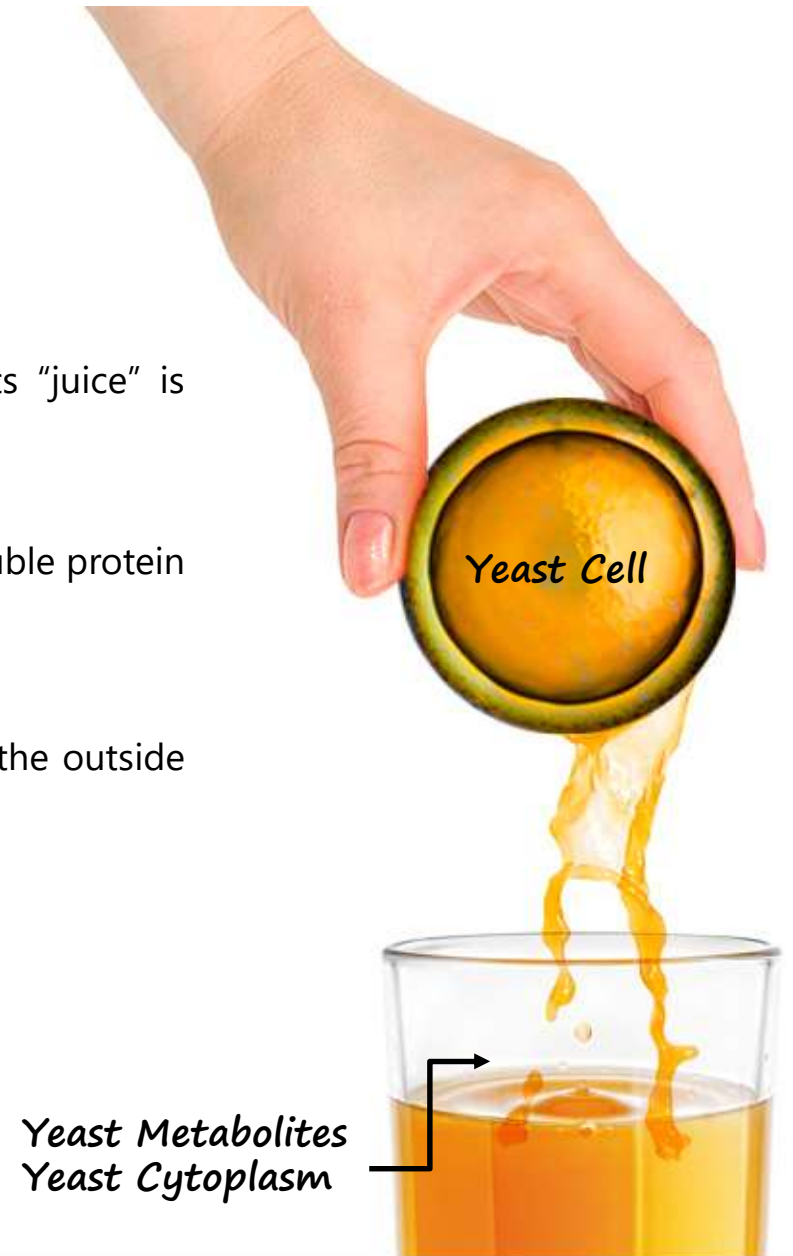
Yeast Autolysates

- ✓ **Yeast Autolysates** consist of whole yeast cells which have been broken open (lysed) by means of letting the yeast cell destroy its membrane using its own autolytic enzymes (autolysates).
- ✓ One can do the same thing by using acids or enzymes to **hydrolyze** the cell (**Yeast Hydrolysates**), or by rupturing the cell using osmotic pressure due to suspending the yeast cells in a high salt solution, called plasmolysis (Yeast Plasmolysates).
- ✓ Typically, producers will combine these three techniques in order to produce a high quality "autolysate". **Yeast Autolysates** contain both the cell contents (also referred as metabolites, nutrilites, cytoplasm, yeast extract) and the cell-wall of the cell.
- ✓ **Yeast Autolysates** are used extensively by the food industry for their ability to enhance food flavors, especially in soups and snack products. This enhancement is due to the yeast's nucleic acid content – the 5'nucleotides. The nucleotides add "savoriness" to food by accentuating the effects of glutamic acid or monosodium glutamate to enhance flavors.



Yeast Autolysates

- ✓ A yeast cell is very similar to an orange, where its “juice” is equivalent to the yeast cytoplasm / metabolites.
- ✓ The yeast metabolites, or yeast cytoplasm, is the soluble protein from the within the yeast cell.
- ✓ The autolysis will “squeeze” the yeast cytoplasm to the outside of the yeast cell wall.

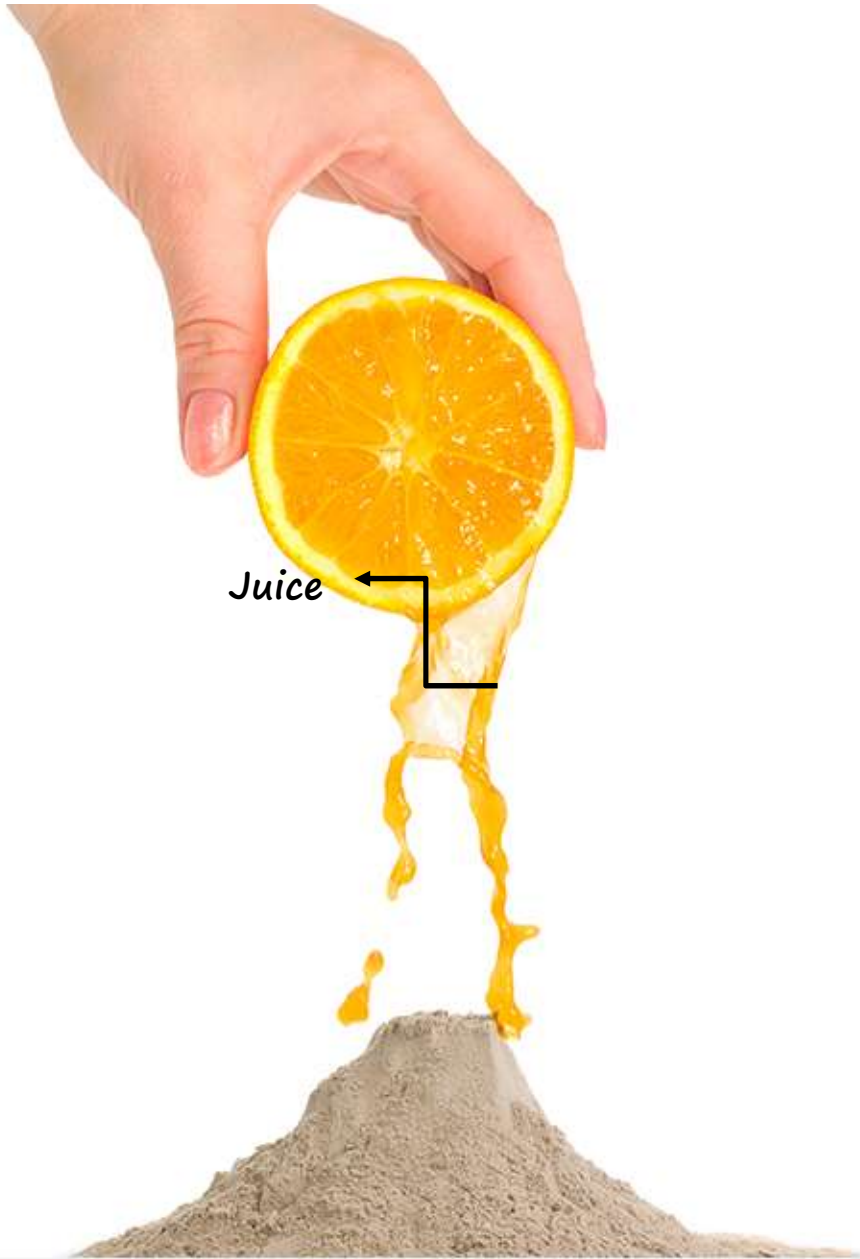


Yeast Culture

- ✓ Yeast Culture is the only defined feed-yeast product which does not consist solely of yeast cells or yeast biomass. It is a yeast-fermented grain mash to provide fermentation metabolites (yeast extracts, cytoplasm) resulting from the slow dying process of the active yeast on the grain mash it is blended with.
- ✓ The production of fermentative metabolites by the yeast cells, sometimes referred to as "nutrilites" or "yeast cytoplasm" or "yeast extract", is the principle behind the yeast culture fermentation
- ✓ Though these products have experienced some acceptance in the market, it is important to notice that the total yeast content on a yeast culture is rather limited.



Yeast Culture
=
Whole Yeast
Yeast Cell Wall
Yeast Cytoplasm
+
Mash Grains



Juice



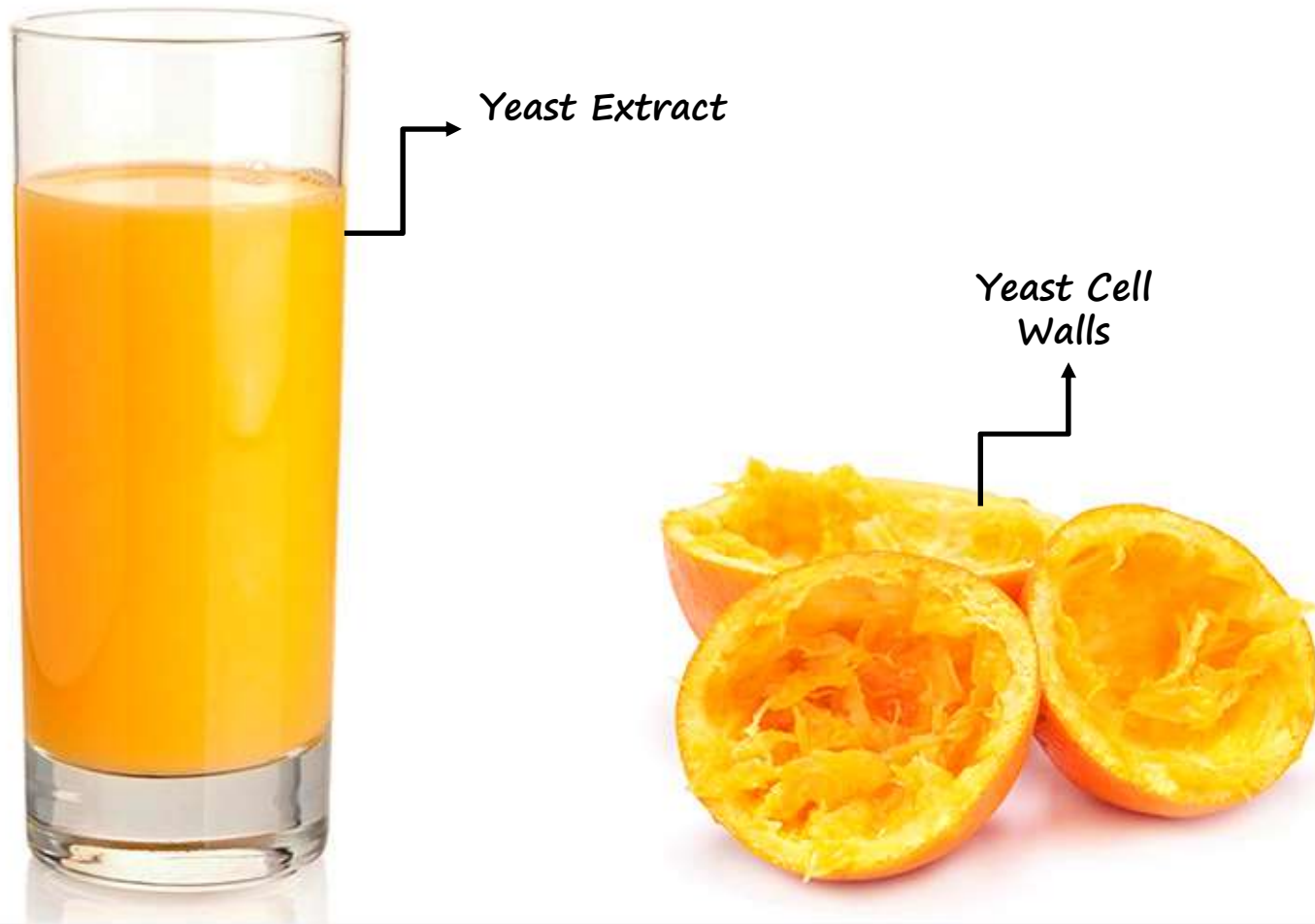
Adding value to nutrition

Yeast Extracts

- ✓ **Yeast extracts** are produced from whole yeast cells, either debittered brewers yeast or primary grown bakers yeast, and are used extensively in the food industry for flavor enhancement.
- ✓ **Yeast extracts** consist of the intracellular components of the yeast cell (cytoplasm, metabolites), with the yeast cell-wall removed. It contain 5'-nucleotides and glutamate which enhance flavor recognition.
- ✓ **Yeast extracts** are also used as microbial stimulants in the fermentation industries and microbiologists use them in their laboratory growth media to optimize bacterial growth.



Yeast Extracts



Adding value to nutrition

Hydrolyzed Yeast as a Source of Free Nucleotides

- ✓ Yeasts are a good source of protein or amino acids. Approximately 40% of the weight of dried yeast consists of protein. The quality of yeast protein is excellent for a vegetable protein, as it is rich in lysine. As with other plant proteins, yeast protein is low in the sulfur amino acids, but supplementing dried yeast with 0.5% methionine can raise its protein quality up to that of casein.
- ✓ However, there is a limit to how much yeast can be fed, because about 20% of the crude protein nitrogen in yeast is in the form of nucleic acids (RNA content in yeast can vary between 6% to 8 %).
- ✓ Nucleic acids can cause problems if over fed, because excessive nucleic acid intake results in elevated uric acid levels in the blood. High levels of uric acid tend to crystallize in the joints and this can cause gout and arthritis or even renal stones.



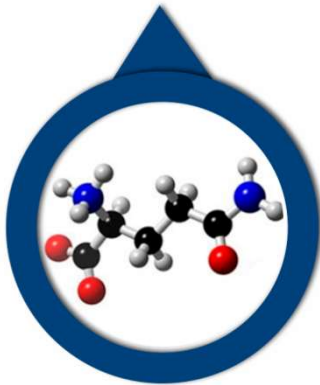
Hilyses[®] - Hydrolyzed Yeast as a Source of Free Nucleotides

- ✓ **Hilyses[®]** is a yeast autolysate with additional hydrolyzes of the nucleic acids into free nucleotides and nucleosides.
- ✓ While whole nucleic acids can pose a health threat, the free nucleotides and nucleosides are immediately absorbed by the body, helping to promote the immune system and to induce faster growth.
- ✓ **ATTENTION:** The wording “hydrolyzed yeast” does not mean that RNA is digested into free nucleotides.

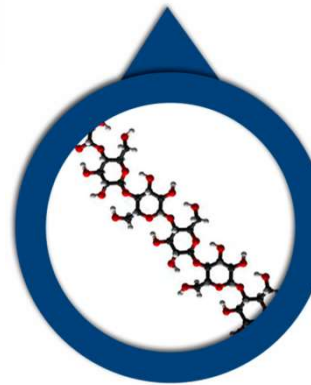


Hilyses[®] Composition

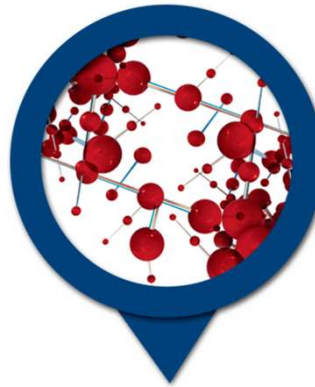
Glutamine
Aprox. 5%



β - Glucans
Aprox. 20%



**Free Nucleotides
& Nucleosides**
6% ~ 8%



**Peptides & Short
chain poly peptides**
Aprox. 36%



MOS
Aprox. 12%



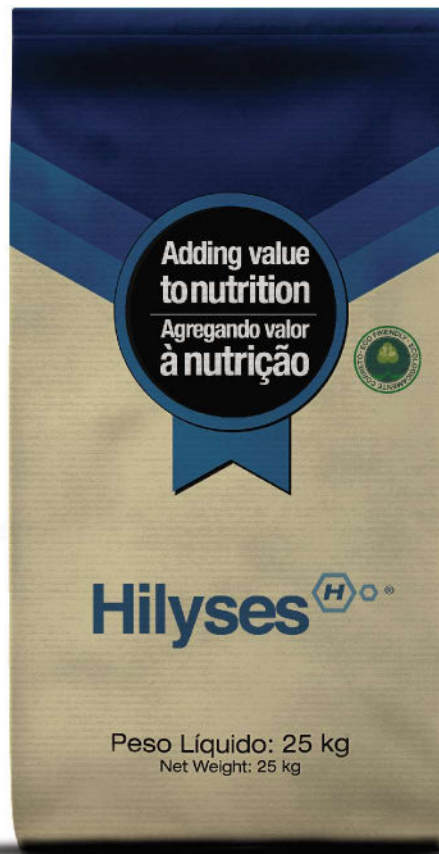
No Preset Inclusion Rates!

- ✓ If the aim is targeted nutrition to very young animals, breeders and lactating sows, then inclusion rates should be higher: between 4 and 10 ponds per ton.
- ✓ If the aim is the benefits of the functional carbohydrates and the prebiotic effect, then inclusion rates should be lower: between 1.0 to 2.0 pounds/ton.



- ✓ ICC believes that *Saccharomyces cerevisiae* yeast should be present in all feed formulations because it is a proven feed additive. Probably, yeast is the most studied natural feed additive, and the data supporting its usage is compelling.
- ✓ An important aspect is that yeast is a multi task additive, helping on promoting growth, intestinal health, mycotoxin adsorption, feed palatability and B vitamins supplementation, and it is a cost competitive solution.
- ✓ The decision that will be particular to each nutritionist is about the inclusion rates.
- ✓ But, if a yeast product is indeed used, **IT MUST BE A PURE PRODUCT!**
- ✓ ICC's proposition behind the **Hilyses**[®] concept, it is to unleash all potential benefits present in a yeast cell.





*****For inclusion rate details, see technical sheet.**