

The benefits of using a live yeast in ruminant nutrition instead of an inactive one

by Liz Norton, Technical Manager, Micron Bio-Systems.

Yeast based products have been available for use in ruminant nutrition for many years as a strategy to counteract the negative effects of modern energy-dense diets on the rumen environment and improve rumen efficiency. However there are several types of yeast product available commercially and different terminology is used to describe them which can be misleading when deciding which product to use.

Saccharomyces cerevisiae is the organism common to the majority of yeast-based products available in ruminant nutrition.

- Live yeast (also known as active yeast). Products thus described contain a pure culture of metabolically active yeast cells and are characterised by low inclusion rates (0.5-10g/h/d).

- Yeast culture (also known as fermented yeast, yeast hydrolysate, scrap yeast, yeast extract). This refers to products of yeast fermentation and contains a mixture of live cells, dead cells, contents of broken cell contents, cell wall components and the metabolites and media they were grown in. The number of live cells are not guaranteed and as a result these products tend to have higher inclusion rates (for example 100g/h/d).

- Brewer's yeast. Brewer's yeast is also yeast culture, but that which originated from the brewing process.

- Inactive yeast. This is where yeast is grown to express a certain nutrient, for example selenium. The yeast is inactivated and harvested for that nutrient.

Advantages of live yeast

The critical mode of action by live yeast is its ability to scavenge oxygen in the rumen. For this it needs to be metabolically active (alive).

Removal of oxygen from the rumen stimulates the growth of fibre degrading bacteria in the rumen. This obviously results in improved forage degradation but yeast can

also utilise lactate and therefore stabilise rumen conditions. As the live yeast is active in the rumen it also produces metabolites which can be utilised as nutrient sources for the fibre degrading bacteria.

Although yeast culture does not have the ability to scavenge oxygen it has been argued that it can aid fermentation as it contains metabolites which are nutrient sources for rumen bacteria. However since live yeasts are actively undergoing a fermentation in the rumen, they are also producing these metabolites.

Table 1 provides a summary of the benefits of live yeast over yeast culture and inactive yeast. Yeasts used in the brewing industry have been selected for their brewing capabilities and not for their actions in the rumen so results can and will vary.

Furthermore, yeast extracts from the brewing industry have been alcohol shocked; the process of which reduces the viability of the cells.

Live yeast – EU approval

Only a few commercially available products are composed of live yeast. They are all derived from different strains of *Saccharomyces cerevisiae*. These strains have received approval for use in feed additives in Europe under the cate-

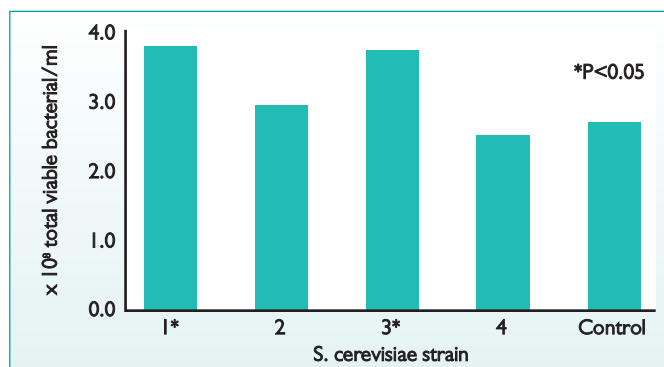


Fig. 1. Effect of yeast on bacterial numbers in Rusitec (Newbold et al, 1995).

gory Gut Flora Stabilisers. This means that these products have undergone extensive research and efficacy trials to meet the strict EU requirements. Yeast culture, as products of a yeast fermentation, are not approved as feed additives but categorised as feed materials. This means they can be freely used in animal feed but they are simply not the same quality as live yeasts.

Not all strains are equal

It is important to remember not all strains are as competent at scavenging oxygen. Fig. 1 shows some data on the effects of different commer-

cially available strains on rumen bacteria number in vitro. Only two strains had a significantly positive effect on bacterial growth.

Sometimes the desired effects are not observed with live yeasts, often to do with storage conditions after it has left the manufacturer. As a live organism it can be fragile and needs to be stored according to the manufacturer's directions. In other words treat it with the respect it deserves.

- Rule 1: Check the label – make sure it is supposed to be live.
- Rule 2: Strictly adhere to the manufacturer's directions for storage conditions.
- Rule 3: Order from your supplier regularly. ■

Table 1. Comparing the benefits of different categories of yeast.

	Live yeasts	Yeast culture	Inactivated yeast
Definition	<ul style="list-style-type: none"> • High cell counts • Pure culture • Low inclusion rate (0.5-10g/h/d) 	<ul style="list-style-type: none"> • Products of a yeast fermentation • Contains a mixture of viable cells, dead cells, cell wall components, metabolites and the media it was grown in • High inclusion rate (100g/h/d) 	<ul style="list-style-type: none"> • Yeast grown to express a particular nutrient • Yeast is inactivated and harvested for that nutrient e.g. Selenium yeast
Oxygen scavenging	Yes	No	No
Provides a source of metabolites for rumen bacteria	Yes	Yes	No
Binding to pathogens/mycotoxins	Yes	Yes	No
Immune stimulatory benefits	Yes	Yes	No