BroilerNet Factsheet S2-C3-2

# Byproducts Delivered Probiotics (Valorization of Agro-industry By-products)

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## Intro to Good Practice

A significant portion of the environmental impact of chicken meat production arises from feed raw materials and additives, particularly for slow-growing strains, which require more feed to produce 1 kg of meat.

A sustainable solution lies in producing feed additives from agro-industrial byproducts, such as crude glycerol, a byproduct of biodiesel producing industries.

**Flask cultivations of the yeast *Yarrowia lipolytica* in experimental conditions.**
Photo: CPERI/CERTH

Certain Generally Recognized as Safe (GRAS) yeasts, such as ***Yarrowia lipolytica***, can grow on these byproducts, which are not suitable for human consumption. After collection and drying, the yeasts serve as **probiotics,** reducing the overall environmental footprint of slow-growing broilers while avoiding competition with food production.

In addition to their sustainability benefits, these probiotics improve gut health, enhancing broilers' welfare. By leveraging circular economy byproducts, this approach aligns with waste reduction principles and resource efficiency, offering an eco-friendly way to lower the environmental impact of chicken production while promoting animal well-being.

## Background & challenges

More sustainable feeds are necessary to meet the increasing needs, and to decrease the environmental footprint of animal products. Yeast proteins produced locally using various agro-industrial byproduct streams, have significant potential as alternative animal feed protein. Particularly, *Yarrowia lipolytica*, an oleaginous, non-pathogenic microorganism can grow on a variety of cheap agro-industrial byproducts and can supplement broilers' feed due to its high protein content and probiotic characteristics.

*Yarrowia lipolytica* grown on crude biodiesel was cultivated in pilot-scale bioreactors, collected through filter bag filtration, and spray-dried to obtain a dry powder that can be easily incorporated in the broilers' feeds. The dried yeast can be supplemented in various ratios in the broilers' feed which are able to adapt and efficiently consume feeds containing up to 5% *of Yarrowia lipolytica*.

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## Additional information

*Yarrowia lipolytica* was tested in two experimental scenarios, with 3% and 5% additions to the final feed of slow-growing broilers:

- While the body weight increase showed no statistically significant differences, notable improvements were observed in other areas. Foot health improved with the 3% supplementation, indicating potential welfare benefits.
- In terms of meat quality, both scenarios demonstrated positive outcomes. There was an increase in monounsaturated fatty acid (MUFA) and polyunsaturated fatty acid (PUFA) content, alongside a reduction in saturated fatty acids (SFA). This resulted in an improved PUFA/SFA ratio, contributing to healthier meat profiles.

These findings suggest that *Yarrowia lipolytica* supplementation may enhance specific welfare and nutritional attributes, even if growth rates remain unaffected.

**Feeding trials for the yeast *Yarrowia lipolytica*.**
Photo: VRI/ELGO-DIMITRA

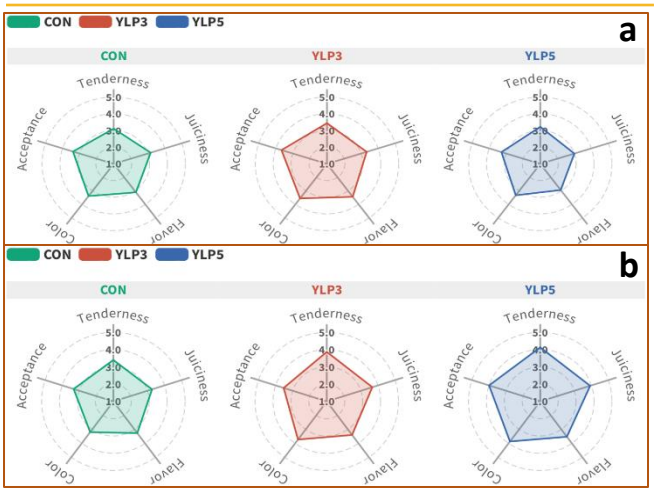
## Benefits

Implementing this good practice yields significant benefits for broiler farms:

**Improved Foot Health**: Notable improvements observed with 3% supplementation.

**Enhanced Meat Quality**:
- Increased monounsaturated fatty acids (MUFA).
- Higher polyunsaturated fatty acids (PUFA).
- Reduced saturated fatty acids (SFA).
- Better PUFA/SFA ratio, leading to healthier meat profiles.

**Animal Welfare**: Positive impact on broiler health without affecting growth rates




**Sensory characteristics of (a) breast and (b) leg meat of broilers fed with standard feed (green) and feed supplemented with 3% (red) and 5% (blue) of *Yarrowia lipolytica*. Characteristics were judged by a consumers' panel on a scale from 1 to 5.**
Photo: https://doi.org/10.3390/su15031924

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