

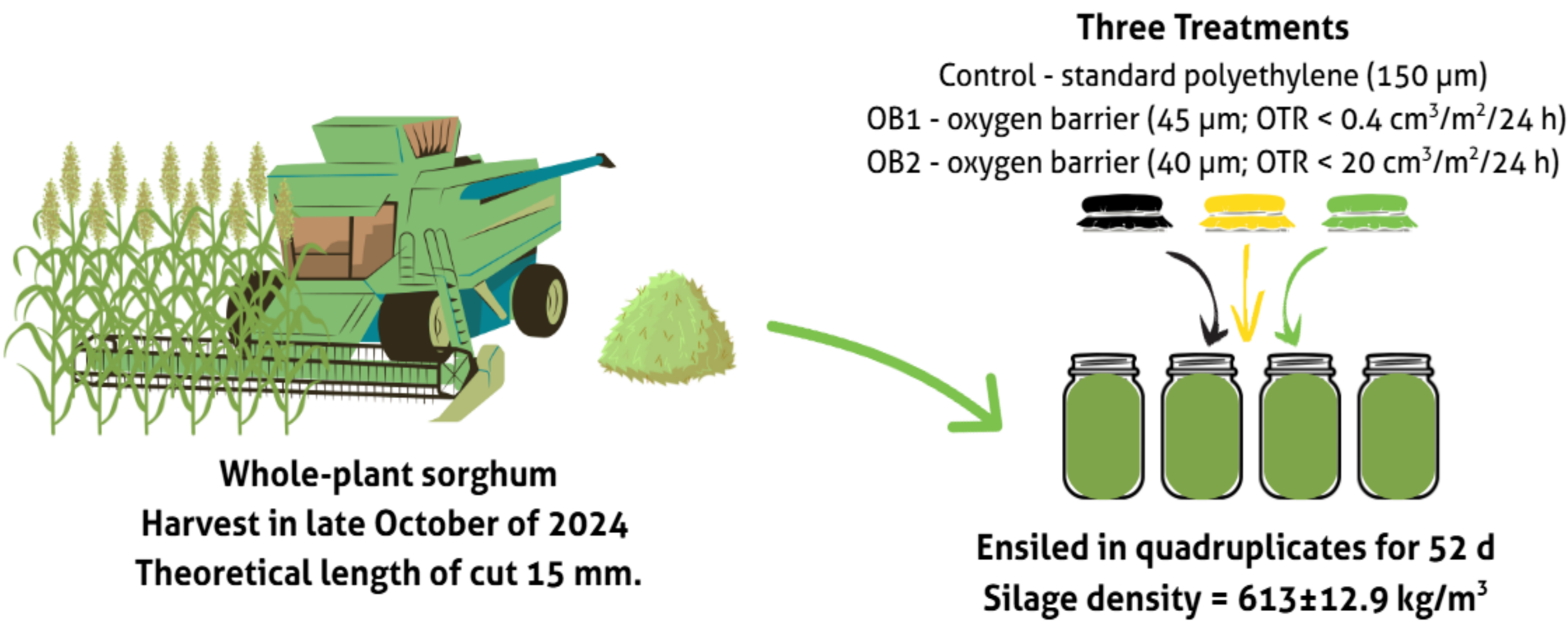


## Introduction

The preservation of silage quality is critical for ensuring consistent and high nutritional value in livestock feed. Maintaining anaerobic conditions during the ensiling process is paramount to minimizing nutrient losses and ensuring high feed quality. While conventional polyethylene (PE) films are widely used due to cost and availability, their high oxygen permeability can lead to aerobic spoilage and dry matter (DM) losses. In contrast, oxygen barrier (OB) films are engineered to significantly reduce oxygen ingress, enhancing fermentation and aerobic stability of silages. Limited studies have explored the efficacy of these OB covers in sorghum silage, a crop with distinct fermentation dynamics due to its high fiber and sugar concentrations.

*This study aimed to **compare the performance of a conventional PE cover and two OB in preserving sorghum silage for a short storage period, focusing on their effects on fermentation profile, silage hygiene and DM losses.***

## Experimental Design



**Gas Loss Estimation & DM Recovery** (difference in weight) & **Inedible Silage** (visual presence of moldy, darker, slimy silage)  
**Chemical Composition (NIR), Fermentative Profile** (Muck and Dickerson, 1988) & **Microbial Counts** (yeast and mold counts (AOAC Official Method, 2014.05))  
**Estimated Aerobic Stability**  
Calculated using the log of yeast counts and the equation described by Kung et al. (1998).

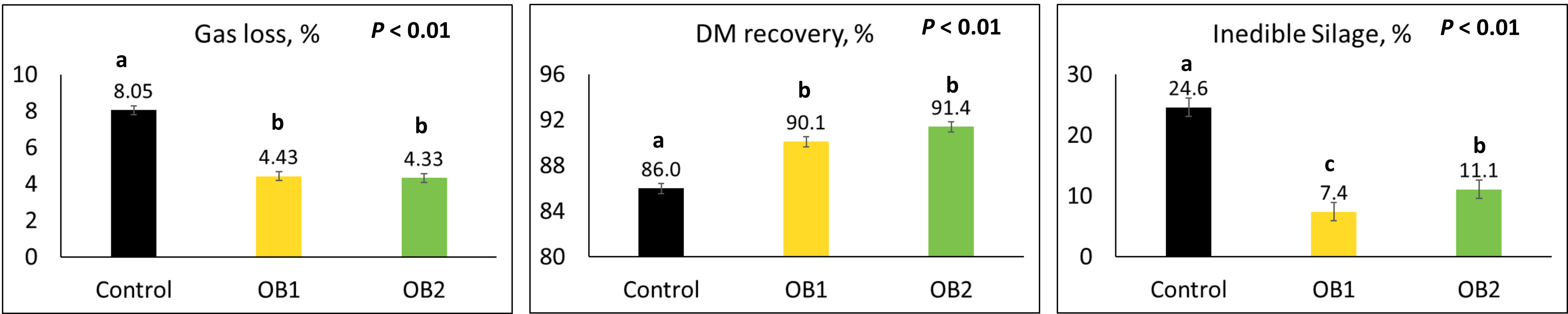
**Table 1. Chemical composition of fresh sorghum forage**

| Item            | Average | SD   |
|-----------------|---------|------|
| DM, %           | 29.0    | 0.94 |
| CP, as % DM     | 7.73    | 0.07 |
| WSC, as % DM    | 10.7    | 0.44 |
| Starch, as % DM | 15.5    | 1.68 |
| NDF, as % DM    | 49.4    | 1.74 |
| ADF, as % DM    | 30.5    | 1.24 |
| Lignin, as % DM | 3.95    | 0.39 |
| Ash, as % DM    | 4.91    | 0.15 |

Analyzed in a commercial laboratory using NIR. N=2.

## Results and Discussion

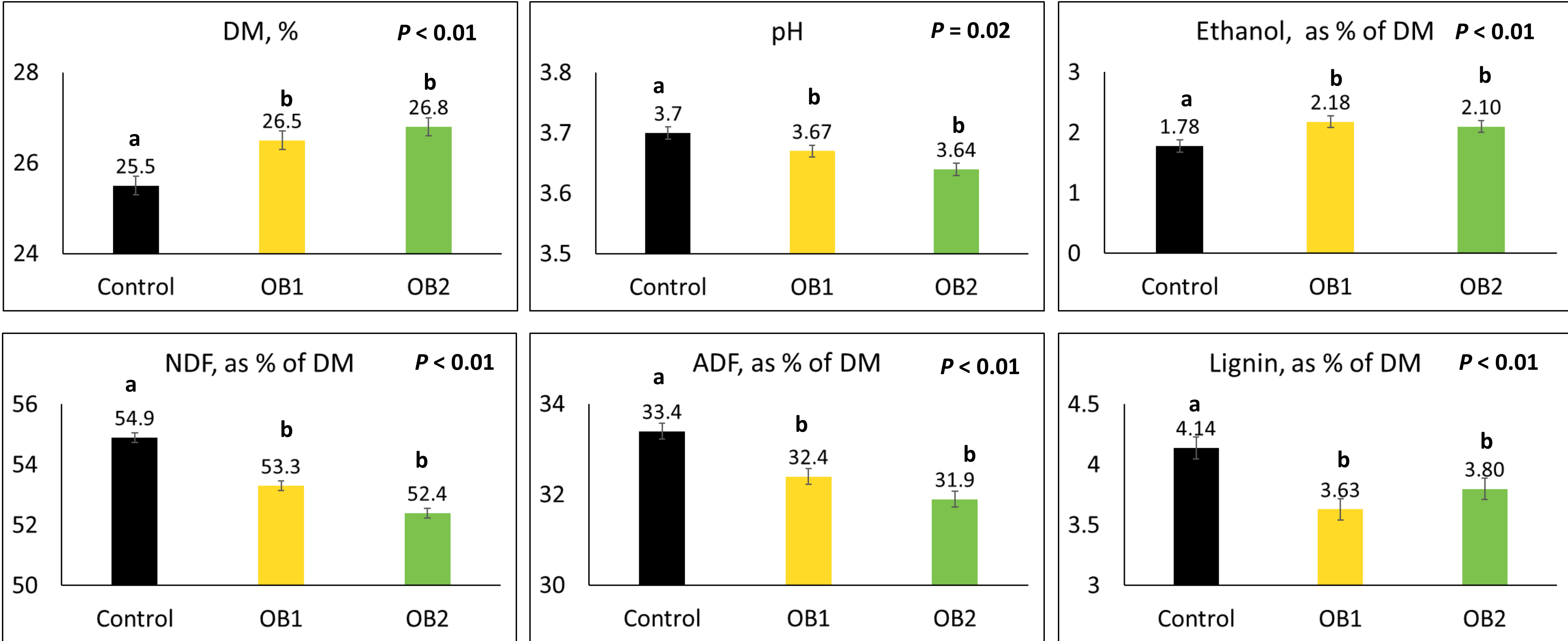
### Effects of OB on Gas Loss, DM Recovery & Inedible Silage



- Silages covered with OB films—regardless of their oxygen transmission rate (OTR)—showed lower gas losses, reduced inedible silage, and greater DM recovery compared to the Control (standard PE).
- OB films with an OTR < 0.4 cm³/m²/24 h resulted in the lowest proportion of inedible silage.

These results emphasize and confirm the added value of using covers with very low oxygen permeability to optimize silage preservation, reducing losses and maximizing edible silage post-ensiling. Additionally, high quality OB films (OTR < 0.4 cm³/m²/24 h) achieved the greatest reduction in inedible sorghum silage.

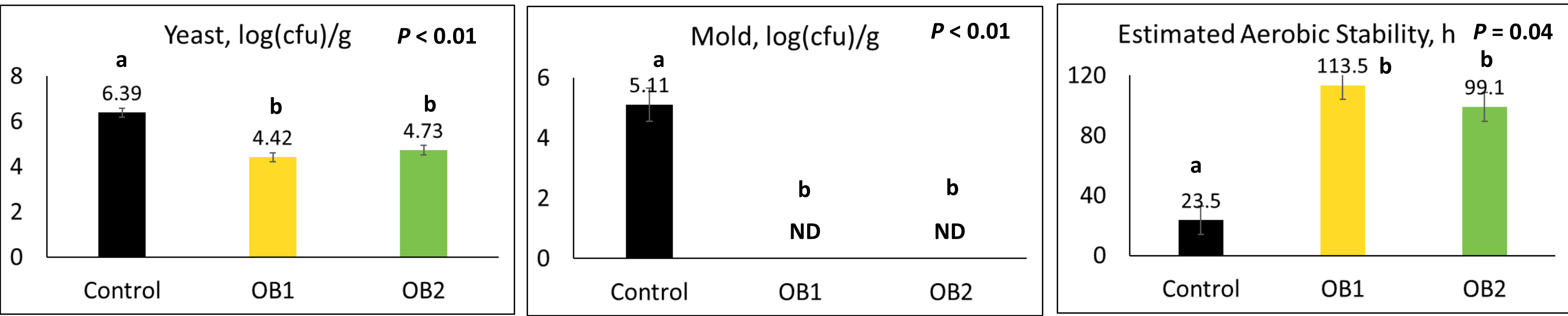
### Effects of OB on Chemical Composition & Fermentative Profile



- Silages sealed with OB films exhibited higher DM concentration and lower concentrations of structural fiber components such as NDF, ADF, and lignin, when compared to those covered with Control.
- Silages covered with OB films displayed slightly lower pH values and higher ethanol concentrations.

These trends point toward enhanced microbial activity under anaerobic conditions and reduced nutrient degradation.

### Effects of OB on Microbial Counts & Estimated Aerobic Stability



- Silages covered with OB films demonstrated improved silage hygiene, as evidenced by lower yeast counts and non-detectable levels of mold, compared to silages sealed with conventional PE.

The reduced presence of spoilage microorganisms suggests that OB films more effectively maintain anaerobic conditions during storage which contributes to delayed spoilage and extended feed-out stability.

## Conclusions

This study demonstrated the following key findings regarding the use of OB films as silage covers even during short-term storage and challenging ensiling conditions such as low DM and high WSC:

- Reduced DM Losses - contributing to better silage preservation and feed quality.
- Lower Proportion of Inedible Silage - enhancing the efficiency of silage utilization.
- Improved Silage Hygiene - OB films with an OTR of <20 cm³/m²/24 h significantly improved overall silage hygiene when compared to conventional PE films.
- Superior Performance of High-Barrier Films - OB films with an OTR < 0.4 cm³/m²/24 h achieved the greatest reduction in inedible sorghum silage, underscoring the value of higher oxygen barrier properties.

