

Hygienic value of barley and wheat straw under good harvest and storage conditions

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Introduction

- Straw is seen as a bedding material and low-value forage as well as an enrichment material to improve animal welfare
- A golden-yellow colour with a familiar smell often defines the quality of straw
- Good harvest conditions and dry storage area help maintain quality
- Straw can contain high counts of undesirable microorganisms, especially if produced and stored in less than ideal conditions
- **This experiment investigated the yeast and bacteria count of straw made and stored under good conditions**

Material and Methods

- Commercial farm northwest Germany 2018
- Barley (*Hordeum vulgare*) and wheat (*Triticum aestivum*) straw, 90-100 kg square bales
- Optimal harvest conditions (warm, sunny, dry)
- Tedded and baled within two days after harvest
- Stored undercover in a barn
- Measurements:
 - Field, one, 30 and 100 days after bailing
 - Yeast and aerobic mesophilic bacteria counts
 - Dry matter, visual appearance, water activity, temperature

Conclusion

- Straw can be a source of bacteria and especially of yeast and it can exceed values for good feeding value in animal husbandry
- Bacteria and yeast contamination are field born and can survive in straw
- Properties as dry matter, temperature, water activity as well as good harvest and storage conditions are not always a valuable prediction of the hygienic status
- Straw should be tested for bacteria and yeast counts before using it

Results and Discussion

- Aerobic mesophilic bacteria count (Table 1)
 - Counts in wheat were higher than in barley
 - Both straw types had relatively stable bacteria counts during storage
 - Counts below the threshold of 1×10^8 CFU/g but may still can cause respiratory issues
- Yeast count (Table 1)
 - High in the field for both
 - Relatively stable in barley
 - Small peak for wheat at day one, afterwards decrease
 - Barley and wheat often over the value of 4×10^5 CFC/g for good feed value
- No sensory quality issues could be detected
- No temperature increase in wheat, but a peak for barley at day one, afterwards both similar to ambient (Figure 1)
- Dry matter and water activity decreased over time

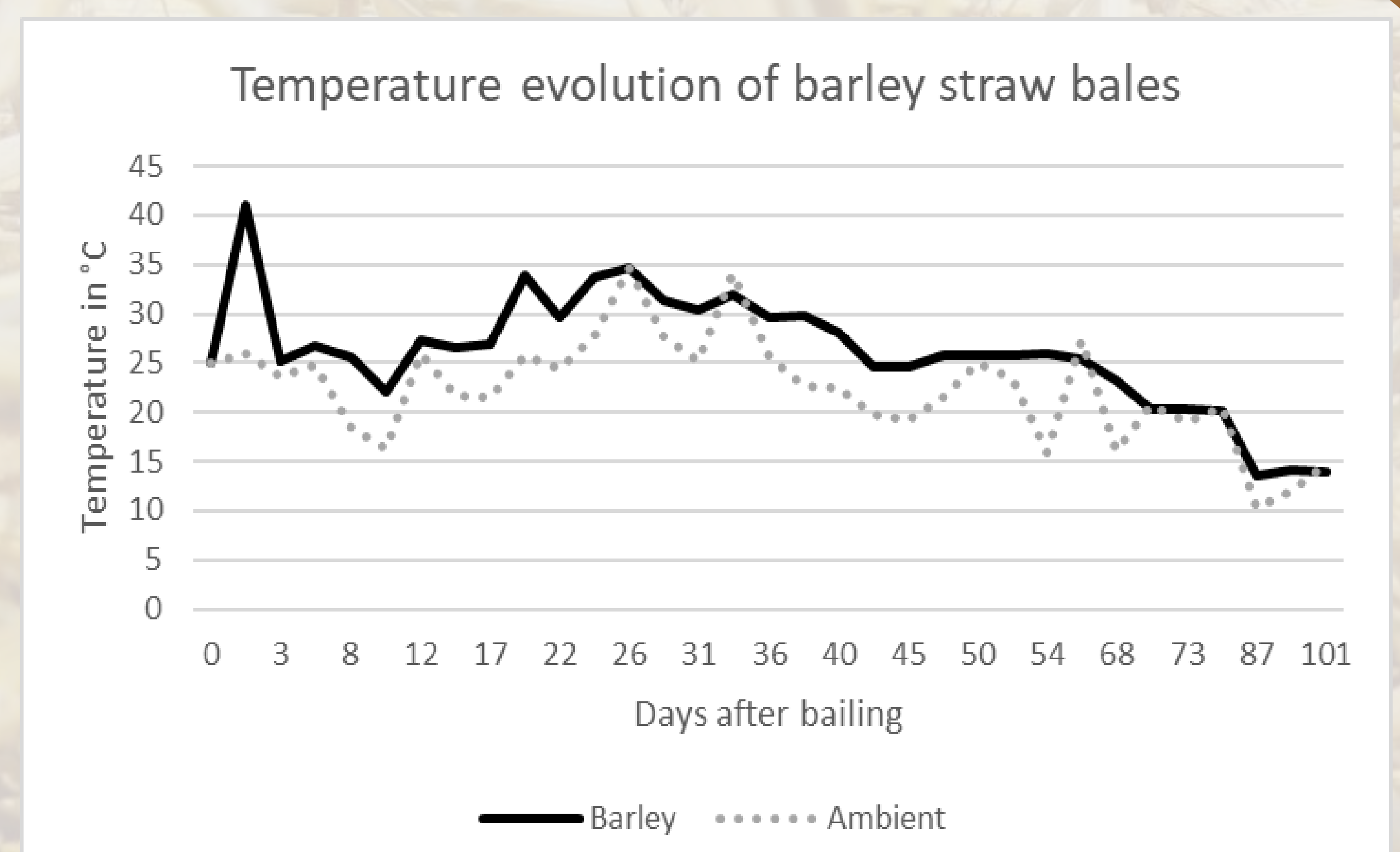


Figure 1: Temperature evolution of barley straw bales (Wheat data were not included as they showed no pronounced temperature increase)

Table 1: Characteristics of wheat and barley straw at field and different storage time

Crop	Field		Day 1		Day 30		Day 100	
	Wheat	Barley	Wheat	Barley	Wheat	Barley	Wheat	Barley
Dry matter g/kg	91.4	88.1	89.7	89.6	88.0	87.2	84.0	83.9
Water activity	-	-	0.38	0.22	0.58	0.47	0.72	0.66
Yeast CFU/g	8.5×10^5	8.5×10^5	2×10^6	5×10^5	5×10^5	2.1×10^5	4×10^4	8×10^5
Bacteria CFU/g	1.8×10^7	3.7×10^6	4×10^7	6.2×10^6	1×10^7	4.4×10^6	6.7×10^6	4.6×10^6