The Sicilian Whey: Utilization of Ricotta whey in the production of value-added artisanal beers.

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SUMMARY

The aim of this research was to evaluate whether scotta, the whey left from Ricotta making, could replace some of the water utilized in beer production and result in acceptable beverages.

Our previous work has shown that lactose-rich by-products like yogurt whey, whey permeate, and milk permeate can be utilized in conjunction with barely or alone to make alcoholic, beer-like beverages.

Our work demonstrates that scotta can be successfully used in the production of sensorial acceptable beer styles, like Goses and milk stouts, whose profiles compliment the natural components found in scotta, such as salt, sugar, and acidity.

This work highlights the opportunities for dairy producers to upcycle dairy by-products into novel beverages with flavor profiles that would be appealing consumers.

INTRODUCTION

There is a long history of utilizing every drop of milk in cheese making. In Italy, Ricotta cheese was a means to recover and valorize the protein left in the whey from Ragusano cheesemaking. Scotta is the lactose-rich, high salt, whey by-product of Ricotta making. Scotta is currently disposed of, however the increasing need to reduce waste and improve the profitability of cheesemaking has created an interest in developing new value-added alternatives for scotta. In this study, we investigate the utilization of scotta in beer production, where the lactose can be used to generate alcohol or sweetness for the product.

OBJECTIVE

To utilize scotta in the production of artisanal beer styles and evaluate whether they would conform to established sensory profiles for those styles.

MATERIALS & METHODS

A Gose-style lager: The style originated in Leipzig, Germany traditionally involves fermentation with both lactic acid bacteria and yeast, with the addition of salt. In this product, the scotta contributes the salt. The final beer was 4.64% ABV with 0 g/L residual sugar.

Milk stout: Belonging to the stout family, having a more pronounced body and sweetness, due to the addition of lactose. The lactose is not fermentable by the yeast, thus remains to provide residual sweetness. In this product the scotta contributes the lactose. The final beer was 4.04% ABV with 16 g/L residual sugar.

Table 1. Analysis of scotta from producers in Sicily

<table>
<thead>
<tr>
<th>Farm</th>
<th>pH</th>
<th>Protein (%)</th>
<th>Fat (%)</th>
<th>Lactose (%)</th>
<th>Salt (%)</th>
<th>Dry Matter (%)</th>
<th>Triturable Acidity</th>
<th>Total Plate* Count (CFU/g)</th>
<th>MRS* (CFU/g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6.19 ± 0.31</td>
<td>0.53 ± 0.09</td>
<td>0.06 ± 0.05</td>
<td>4.49 ± 0.19</td>
<td>0.78 ± 0.33</td>
<td>5.53 ± 0.28</td>
<td>4.15 ± 0.86</td>
<td>&lt; 10 to 7,300</td>
<td>&lt;10 &lt;10</td>
</tr>
<tr>
<td>2</td>
<td>6.05 ± 0.12</td>
<td>0.60 ± 0.03</td>
<td>0.07 ± 0.04</td>
<td>5.12 ± 0.09</td>
<td>1.23 ± 0.20</td>
<td>6.37 ± 0.10</td>
<td>4.97 ± 0.39</td>
<td>&lt; 10 to 100</td>
<td>&lt;10 &lt;10</td>
</tr>
<tr>
<td>3</td>
<td>6.32 ± 0.18</td>
<td>0.76 ± 0.33</td>
<td>0.76 ± 0.63</td>
<td>4.29 ± 0.82</td>
<td>1.12 ± 0.04</td>
<td>7.37 ± 1.03</td>
<td>4.81 ± 1.64</td>
<td>&lt; 10 to 180</td>
<td>&lt;10 &lt;10</td>
</tr>
<tr>
<td>4</td>
<td>5.90 ± 0.13</td>
<td>0.42 ± 0.05</td>
<td>0.10 ± 0.07</td>
<td>4.40 ± 0.21</td>
<td>0.78 ± 0.37</td>
<td>5.41 ± 0.23</td>
<td>4.72 ± 1.06</td>
<td>50 to 2500</td>
<td>&lt;10 &lt;10</td>
</tr>
<tr>
<td>5</td>
<td>6.00 ± 0.05</td>
<td>0.47 ± 0.01</td>
<td>0.21 ± 0.04</td>
<td>4.37 ± 0.06</td>
<td>1.04 ± 0.05</td>
<td>5.76 ± 0.10</td>
<td>5.16 ± 0.33</td>
<td>&lt;40 to 1,400</td>
<td>&lt;10 &lt;10</td>
</tr>
<tr>
<td>6</td>
<td>6.07 ± 0.05</td>
<td>0.50 ± 0.06</td>
<td>0.07 ± 0.06</td>
<td>5.02 ± 0.19</td>
<td>1.03 ± 0.10</td>
<td>6.08 ± 0.24</td>
<td>4.76 ± 0.58</td>
<td>&lt;10 to 20</td>
<td>&lt;10 &lt;10</td>
</tr>
</tbody>
</table>

Note: all averages from 4 samples taken on different days, except for farm 7 which only had 2 samples

* Denotes the max and minimum microbial counts across the samples taken

CONCLUSIONS

- Scotta is consistent in its analytical attributes, making it a suitable ingredient, though there is some variability between producers.
- Scotta can be incorporated into beer production, and its natural properties can be used to add specific attributes to beer like sweetness, saltiness, or alcohol.
- These scotta-containing beers fall acceptably within the profiles of current commercial beer styles, suggesting scotta can be upcycled to make value-added beers that consumers would enjoy.

REFERENCES


AKNOWLEDGMENTS

- “Tradizioni produttive casearie a basso impatto ambientale da spillare” [Traditional dairy production with low environmental impact to be tapped] TPCbIAs, funded by the PSR Sicilia 2014-2022 Misura 16.1