Development of a Predictive Model for Total Solids in Beer Based on SRM Color

Jimenez, E*. Osorio, M. Moreno, F. L.** Ruiz Y***

*Master in Design and Process Management, Universidad de La Sabana, Campus Universitario del Puente del Común, Km 7 Autopista Norte de Bogotá, Chía, Cundinamarca, Colombia

**Agroindustrial Process Engineering, Universidad de La Sabana, Campus Universitario del Puente del Común, Km 7 Autopista Norte de Bogotá, Chía, Cundinamarca, Colombia

INTRODUCTION & AIM

Accurate measurement and control of physicochemical properties are crucial in beer production for quality and consumer satisfaction. The concentration of total solids significantly affects sensory attributes like flavor, mouthfeel, and texture. Beer color, measured in SRM (Standard Reference Method) units, is vital for quality assessment, linked to melanoidins from malting. **This study aims to develop a predictive model using SRM color to estimate total solids content**, offering an easy and non-invasive tool for brewers. We collected samples from various beers, using freeze concentration to cover a range of SRM profiles.

METHOD

Samples from various commercial and craft beers were collected by freeze concentration, encompassing a diverse range of SRM color profiles. Color measurements were performed using a CDRbeerLab (4), ensuring accurate quantification of the beer's color. Total solids content was determined through gravimetric analysis, providing a reliable measurement of the solids present.
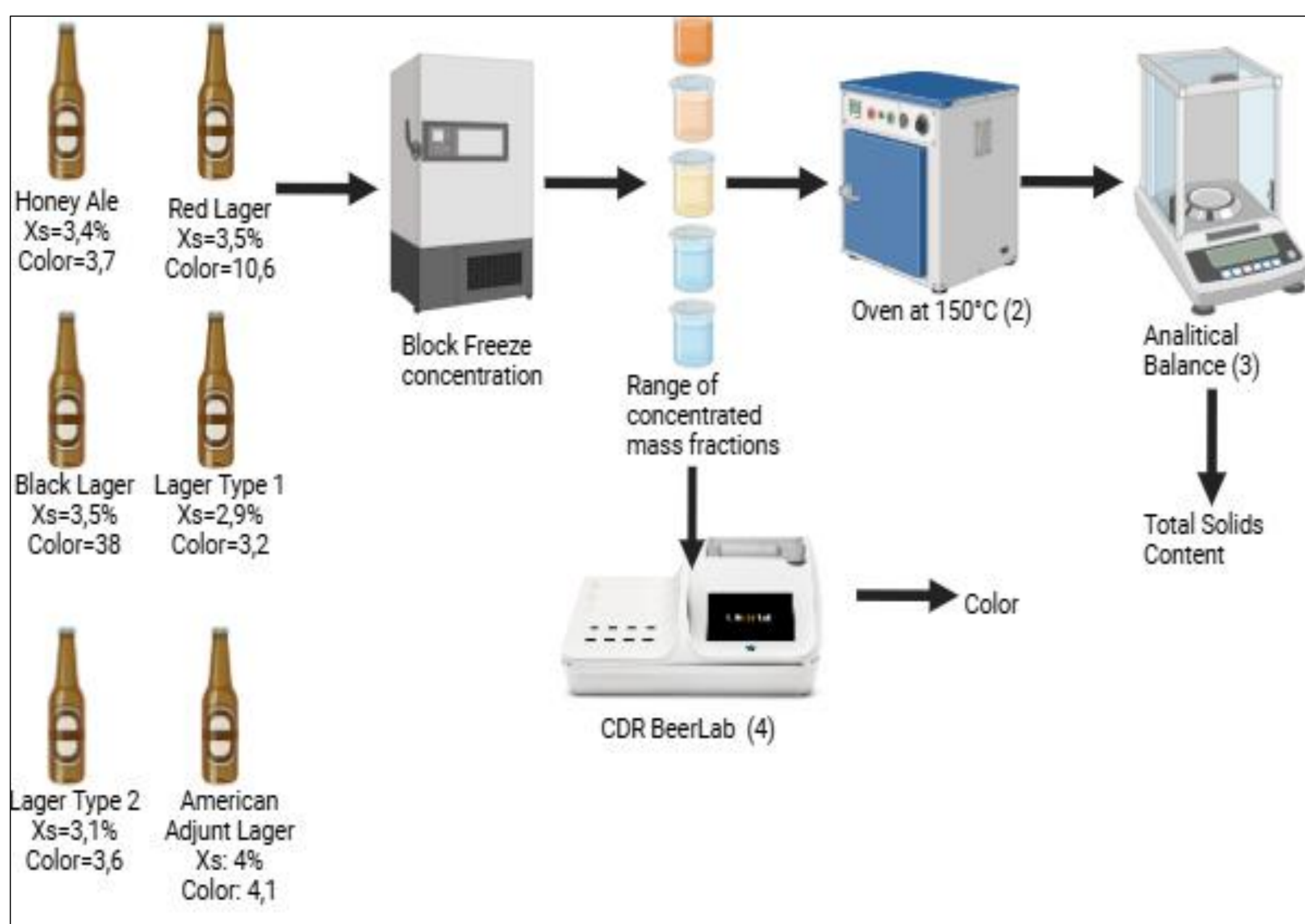

Figure 1. SRM color chart in beer

Figure 2. Methodology graphic description Xs represents the total solids content of original beer
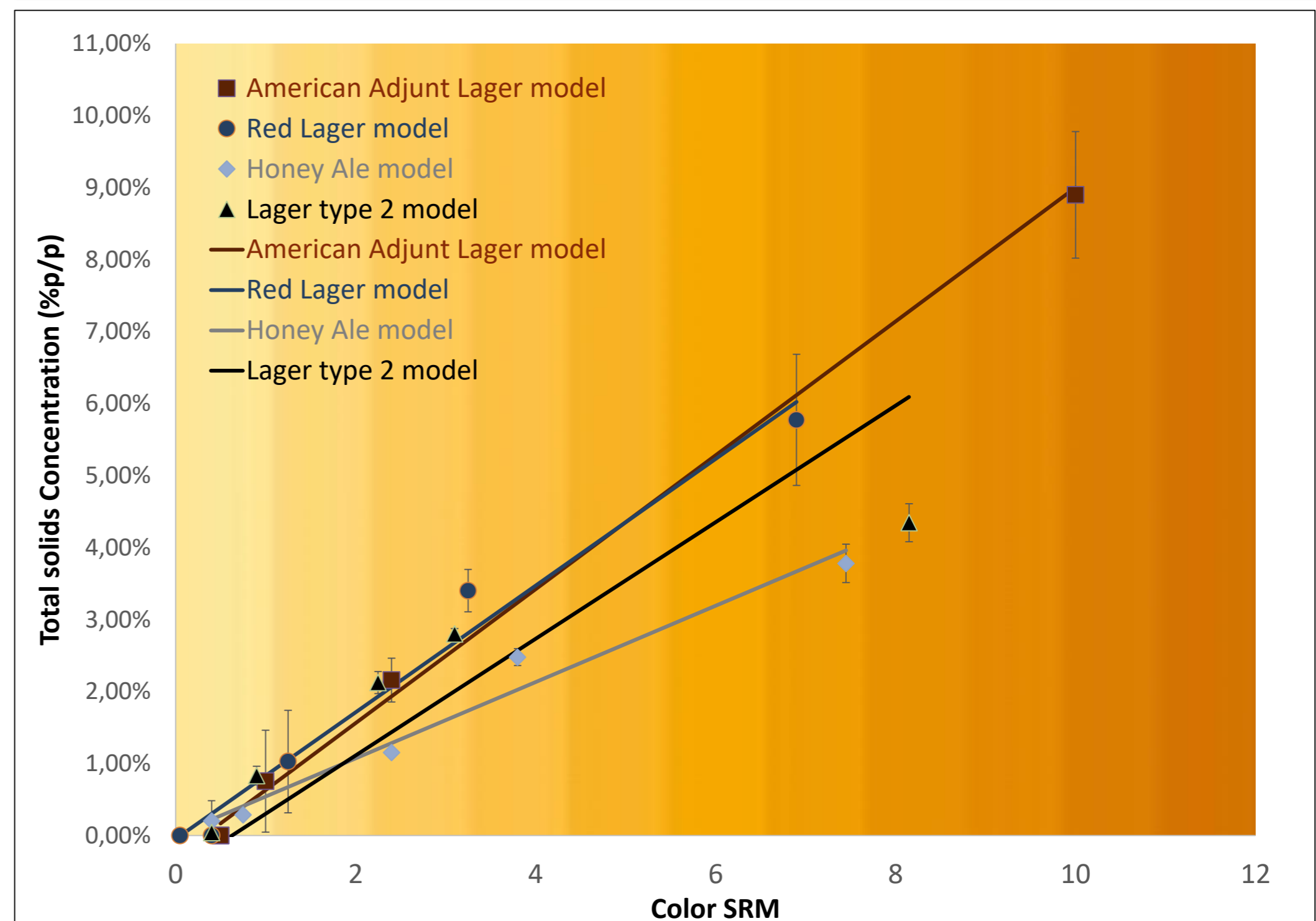
RESULTS & DISCUSSION

.
Figure 3. Relationship between total solids measurement and color measurement on SRM scale for 5 different types of beer, error bars indicate standard deviation

The development of a predictive model based on SRM color demonstrates a substantial advancement in the brewing industry's ability to assess product quality efficiently. The high coefficients of determination (R^2 values ranging from 0.886 to 0.997) achieved across six different beer styles indicate that the model can reliably predict total solids concentration.

Table 1. Correlation Models of 6 different type of beer, where Xs represents the total solids concentration

Type	Equation	R^2
American Adjunct Lager	Xs=0,0093(SRM)-0,0030	0,9977
Red Lager	Xs=0,0088(SRM)-0,0005	0,9800
Honey Ale	Xs=0,0053(SRM)+0,0001	0,9714
Lager Type 1	Xs=0,0076(SRM)-0,0380	0,9620
Black Lager	Xs=0,0011(SRM)-0,0040	0,9438
Lager Type 2	Xs=0,0051(SRM)-0,0051	0,8861

CONCLUSION

The integration of this predictive model into brewing operations could lead to improved product consistency, Future research may explore the expansion of this model to include additional physicochemical parameters

REFERENCES