



Table of Contents

IN PRESS

**AGRICECON
2014**

**AGRICECON
2013**

**AGRICECON
2012**

**AGRICECON
2011**

**AGRICECON
2010**

**AGRICECON
2009**

**AGRICECON
2008**

**AGRICECON
2007**

AGRICECON

2006
AGRICECON
2005
AGRICECON
2004
AGRICECON
2003
AGRICECON
2002
AGRICECON
Home

Editorial
Board

For Authors

- **Authors**
Declaration
- **Instruction**
to Authors
- **Guide for**
Authors
- **Copyright**
Statement
- **Submission**

For
Reviewers

Guides for

· [Reviewers](#)
[Login](#)

[Subscription](#)

Agric. Econ. – Czech

Hron J.:

Design of experiments for the analysis and optimization of barcodes of food and agricultural products

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The tools and modern techniques used in the Design of Experiments (DOE) have been proved successful in meeting the challenge of continuous improvement of food and agricultural products over the last fifteen years. The current

methodological appliance of the DOE is represented by the set of scientific methods for identifying the significant and/or critical parameters associated with the process and thereby determining the optimal settings for those process variables which are able to enhance the performance and capability of the response (e.g. the selected character of a product quality). However, recent researches have shown that the application of these techniques in the food-processing industry and agricultural production are limited due to the lack of statistical knowledge required for their effective implementation (especially in small and medium-sized manufacturing companies). Therefore, this paper focuses on the modified DOE methods (for use in a community of scientists and product engineers), which overcome the problem of statistics by taking a unique approach using graphical tools. The same outcomes and conclusions are reached as by those approaches using statistical methods and the potential users will find the concept in this paper both familiar and easy to understand. In this way, it will ensure a broad practical

application of the methodology that is described in this paper. From the theoretical point of view, the main objective of the paper is to optimize the barcode printing processes on food packaging through the effective application of the DOE techniques in order to discover the significant process parameters which affect the means of the so-called " Z-module" (defines the nominal width of the narrow elements), " GS1 International" (defines certain size ranges), " PCS measurement" (means Print Contrast Signal measurement) and also in order to discover the key parameters which affect their variabilities.

Keywords:

barcode, design of experiments, food packaging, manufacturing process, optimization, printing

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