



Farm-to-Fork SMART LABEL for increasing consumer trust and ensuring support for local milk and dairy producers

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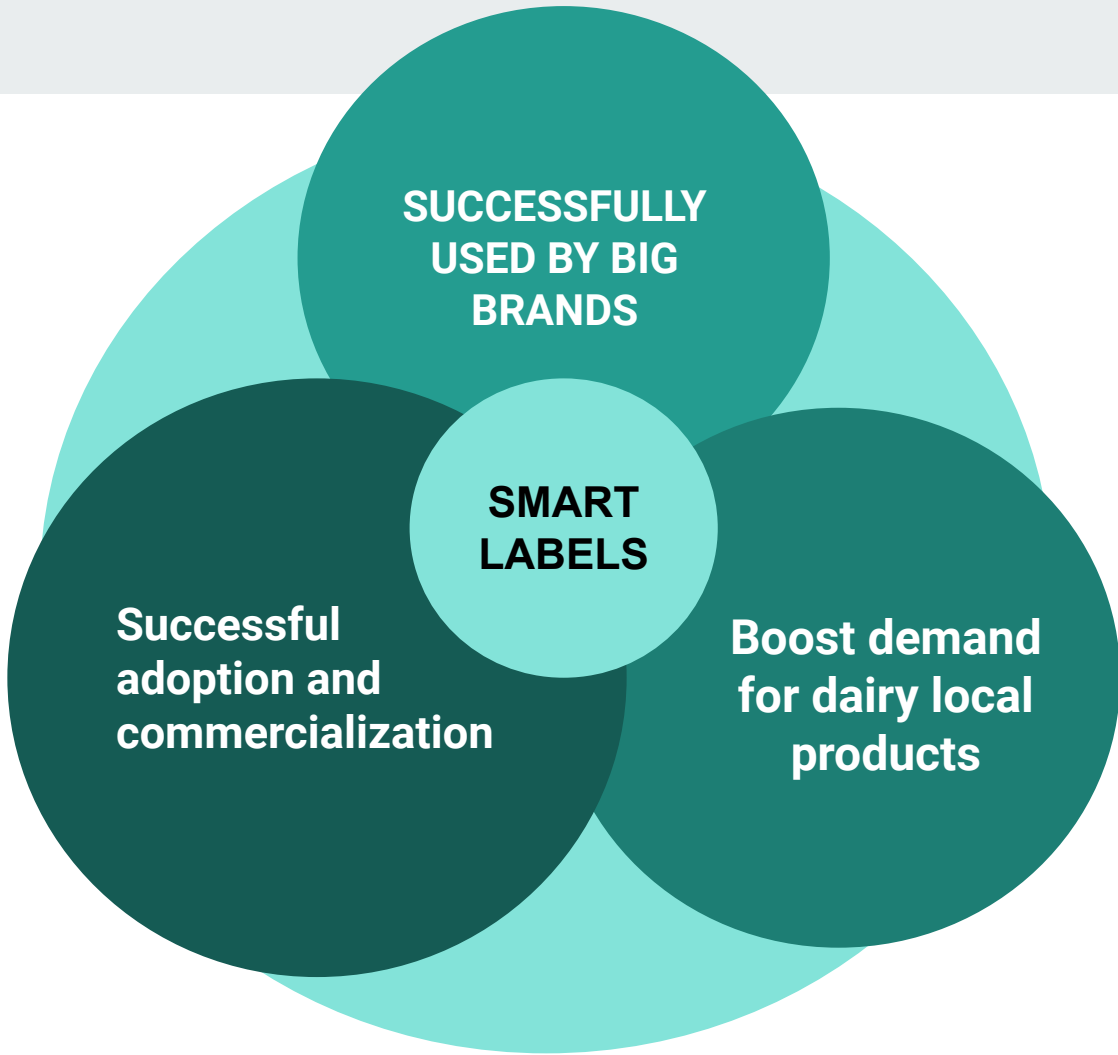
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INTRODUCTION



- The COVID pandemic has modified the consumer perception towards food, more and more attention being given to natural and local ingredients, with low or no preservatives added and raw or poorly processed products, as a way to support good immunity [2].
- As consumer tastes and environmental challenges evolve, the industry becomes ever more diverse and resourceful. Today's consumer is more interested in the raw materials used to obtain the processed products, final product freshness and quality, sustainability, authenticity, transportation, shelf life, and even how recyclable the packaging is.
- The **aim of the present study** was to assess whether the use of smart labels (quick response codes and thermochromic indicator) may increase consumer trust towards locally produced animal origin products, while facilitating the development of an interactive connection between consumers and local producers, where consumers are able to give feedback, ask questions and contribute actively to the development of other the products and services.



- Consumer attitudes toward, and acceptance of, technology development

- information about the dairy product value chain during the life-cycle of the product, nutritional specifications, health-oriented attributes and even recipes in which the product may be used.







MATERIAL & METHODS



- The surveys were conducted on consumers residing in the north-east region of Romania, from March 2021 to June 2021 using electronic questionnaires (TypeForm).
- **Consumers' perception** relating to food labels, respectively the use of QR codes and thermochromic labels for traditional dairy food produced locally such as yoghurt, kefir and hard cheese was assessed.
- The concept of thermochromic indicator and its function was explained to the respondents before applying the questionnaire.
- Questions relating to food labels and perception regarding local produced products were developed by the investigators (Figure 1) and the respondents were invited to complete online the answers.
- For each assessed item, scores from 1-5 were attributed, where 1 represented less usefulness and 5 high usefulness regarding the transmitted information through the proposed tool, respectively QR code and thermochromic indicator (Figure 2). The data retrieved and processed in the Microsoft Excel statistical package.

Figure 1. Survey statements and answers relating to food labels

SURVEY Statements

-  Statements about health benefits, authenticity, safety assurance system on food packaging are a trustworthy source of information
-  The Nutrient Information Panel (NIP) on food label is a trustworthy source of information
-  I consider the origin of a product to be the most important information on a food label when I am buying a food item for the first time
-  I prefer to buy local produced food items because they are fresh and I can support the local food infrastructure
-  I consider detailed information regarding the ingredients of food items to be of paramount importance
-  I consider that additional information provided by symbols or mobile apps such as QR codes are useful in finding healthy food items



Response categories

- Agree completely
- Agree somewhat
- Disagree somewhat
- Disagree completely
- Don't know/prefer not to answer

Figure 2. Survey regarding consumer attitude regarding the level of importance of information that may be transmitted using QR codes and Thermochromic labels

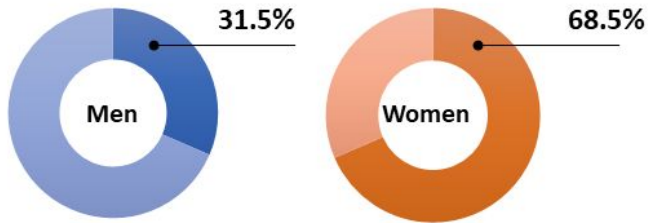


RESULTS

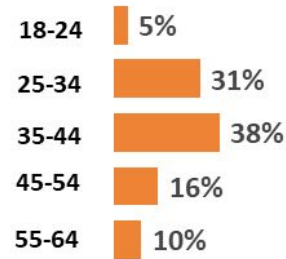


- The demographic characteristics of the survey respondents are presented in Figure 3. Almost two thirds of the respondents from were female (68.5%). The 18–25-year age group, respectively 55–65-year age group were the smallest, accounting for 14.5% and 3.5 % of the survey sample, respectively. Almost 2 thirds of the respondents were in the age category 25–34-year (31 %), respectively 35–45-years (38%) (Figure 3).
- For the first survey, the response rate (questioners completed) was 90.38%. The responses to the statements formulated are presented in the below figures.
- Over half of the respondents considered that details regarding the ingredients of food items are of paramount importance, while 33.22% considered that additional information provided by symbols or mobile apps may be useful in finding health food items

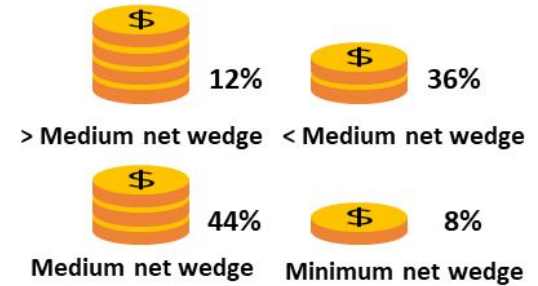
Gender



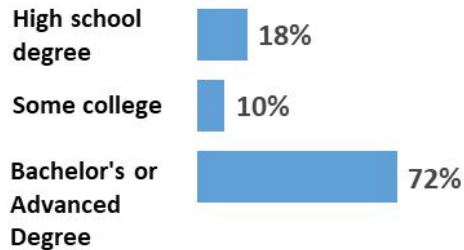
Age



Income



Education



Location

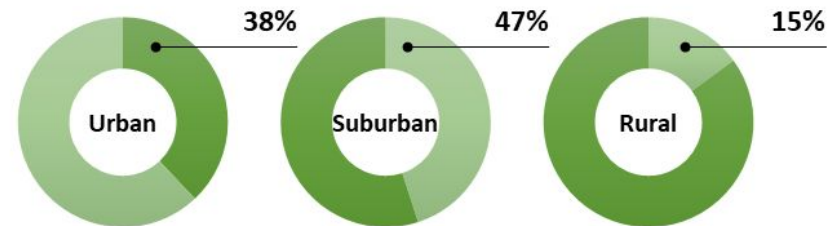
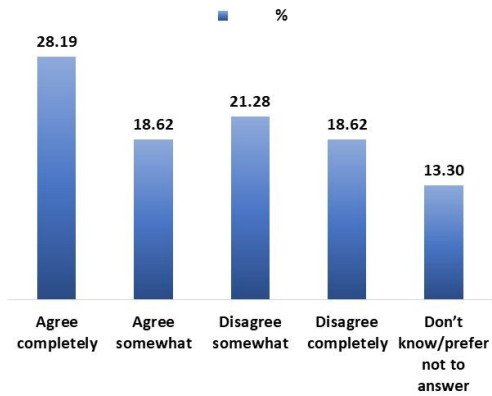
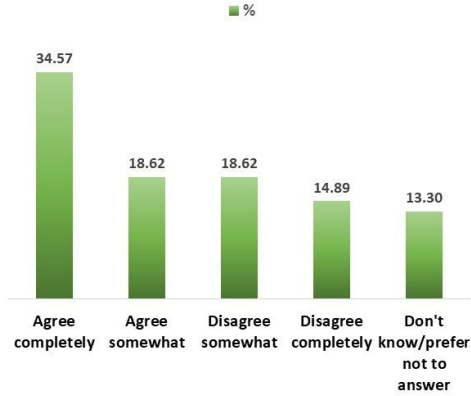


Figure 3. Demographic characteristics of the survey respondents

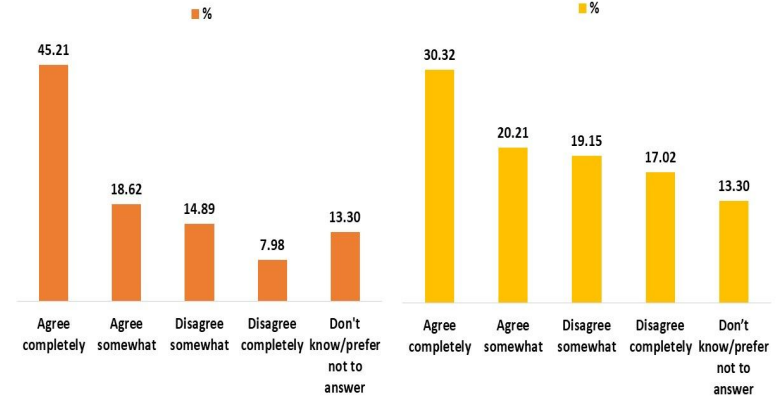


Statements about health benefits, authenticity, safety assurance system on food packaging are a trustworthy source of information



The Nutrient Information Panel (NIP) on food label is a trustworthy source of information

Figure 4. Formulated statements regarding the packing and Nutrient information Panel and responses of the respondents



I prefer to buy local produced food items because they are fresh and I can support the local food infrastructure

I consider the origin of a product to be the most important information on a food label when I am buying a food item for the first time

Figure 5. Formulated statements regarding the origin of products and factors that may influence the purchase

Table 1. Respondents' ratings of "SMART LABELS" with QR code and thermochromic indicator

Assessed item	Consumer attitudes mean score
Nutritional properties of dairy products	4.11
Detailed information on local milk producers and manufacturers, images from farms and production process	4.09
Information regarding the traceability of the dairy products (Transportation and preservation conditions)	3.77
Information regarding the authenticity and quality control of the dairy products (authenticity and quality certificates)	4.45
Temperature monitoring system under the form of a thermochromic indicator	4.25
Link that directly connects dairy manufacturers with consumers for getting more information, offering feedback, comments, suggestions	4.07
Recipes for dishes and desserts using locally produced dairy products	2.11
The recycling potential of the package used	3.35

CONCLUSIONS

- **Smart labels** may increase consumer trust towards locally produced animal origin products, by offering information about the food value chain, quality or authenticity of the locally produced products.
- This approach may also facilitate consumers and local producers to create an interactive connection, where consumers are able to give feedback, ask questions and contribute actively to the development of other the products and services.
- **Growing consumer interest in local animal products** may help reduce the environmental footprint by shortening the distance between farmers and consumers as a result of shifting consumer preferences.
- The support given to the community producers will strengthened the local food infrastructure, generate more jobs, while the population will have access to healthy and fresh products.