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Perceptions on Suitability of Utilizing the Grape Pomace Flour as an Ingredient in Bread Baking and Livestock Feeds Mixing: A Case of Mbarara City-Uganda

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ABSTRACT

The 'Golden Wine Residue Innovation project, funded by the Center for Innovation and Technology Transfer (CITT) at Mbarara University of Science and Technology (MUST), seeks to transform grape winery residues into high-quality Grape pomace flour, with versatile applications in food and livestock feed. To assess the feasibility of utilizing Grape pomace flour in these sectors, a comprehensive market research survey was conducted in Mbarara City, Uganda. Qualitative research methods, including focus group discussions (FGDs) and in-depth interviews, were employed in the study. The research targeted various stakeholders, including grape farmers, grape fruit processors, bakeries, livestock feed processors, and consumers. Three FGDs were organized: one each for bread and livestock feed processors and two for grape producers and product users. Data collection involved interviews and discussions. Thematic content analysis was used to analyze and interpret the gathered data. The findings unveiled a multitude of insights regarding the potential supply of grape winery residues, existing gaps in current ingredients used in bread making and livestock feeds, and the perspectives of consumers towards products featuring Grape Pomace Flour. Key revelations included variations in land ownership among grape farmers, the presence of two distinct harvest seasons, and

the limited utilization of grape residues. Participants expressed their readiness to explore alternatives and embrace Grape Pomace Flour provided it enhances taste, quality, and product shelf life. In conclusion, market research survey highlights promising opportunities for integrating Grape Pomace Flour into food and livestock feed applications in Mbarara City, Uganda. Therefore, to harness this potential, a set of strategic recommendations is proposed which include awareness campaigns, training in residue management, collaboration promotion, quality assurance measures, and adherence to packaging and labeling standards. These initiatives can contribute to sustainable growth in the local agricultural and food industries.

Keywords: Grape Pomace Flour, market research, food and livestock feed, winery residue, innovation project

INTRODUCTION

The 'Golden Wine Residue Innovation' is one of the Grape vine value addition and residue processing innovation funded by the Center for Innovation and Technology Transfer of Mbarara University of Science and Technology. The Innovation Project is housed at the Department of Environment and Livelihoods Support Systems involving two (2) lecturers, students who participated in Student- Community Twinning Project 2022 together with Mabira Bakyara Twetungure Group of Nyarubungo ward, Mbarara City South. The innovation project dubbed "Golden Wine Residue'' seeks to add value to grape winery residues by transforming them into quality Grape pomace flour, a valuable product into making of biscuits, bread, human nutrition and livestock feed supplements. However, the Innovation team lacked information on the abundancy of the residues in the area, current use of the residues, industry acceptability to apply the processed residue in formulating human food and livestock feed supplements, precautions of safety to undertake in transforming the residue and final products consumers' preferences or acceptable levels. To get a better understanding of the situation to inform the next steps, a market research survey was designed and conducted on the 'Perceptions on Suitability of utilizing the Grape pomace flour as an ingredient in baking of bread and livestock feeds mixing. The objectives of the survey were; Objective 1: To identify the potential for supply of Grape winery residues for production of pomace flour (Local leaders, Farmers/farmer Associations/Group leaders, Extension/Development workers), Objective 2: To document the market gaps in the current ingredients used in bread making and livestock (pigs, poultry and dairy cattle) feed mixing, and Objective 3: To explore the perceptions of customers of products made of Grape pomace floor (Bread consumers and Livestock farmers)

MARKET RESEARCH METHODOLOGY

The innovation team employed the qualitative research methods to understand the above situation and adopted the survey design using Focus group discussions and in-depth interviews during data collection. The study targeted grape farmers, grape fruit processors, bread-making bakeries, livestock feed processors, and consumers/users of bread and livestock feeds. Three Focus group discussions (FGDs) were conducted, one for processors of bread and livestock feeds, and two for grape producers and users of final product. Each FGD composed of 6 to 12 participants. Data from FGD participants was collected through interview and discussion of the points on the FGD guide, notes were taken in a notebook by two notetakers and voice recording was done upon participants consent.

The collected data was arranged according to themes generated out of the objectives of the survey, transcription of recordings done and thematic- content analysis of data done.

MARKET RESEARCH SURVEY RESULTS AND INTERPRETATION

The Potential for Supply of Grape Winery Residues for Production of Pomace Flour (Local Leaders, Farmers/Farmer Associations/Group Leaders, Extension/Development Workers)

Average Acreage of Grape Vine for Farmers:

The survey in the first instance intended to establish the land holding by grape farmers and it was found that a section of farmers had around 2 to 3 gardens and the variations were attributed to differences in income levels. Further it was revealed that the largest farmer had 20 trees in the garden of 4 acres totaling to 16 fields and the smallest farmer had planted a quarter an acre totaling to 1 field.

Grapes Harvest Period and Volume Produced:

On average most farmers reported that they have two seasons in the year that is In January - March and July –September. It was further reported that it's during those harvest periods that individual farmers and farmer groups are engaged in the production of wine.

Average Volume of Grapes That Groups Produce in A Season:

The farmers who were engaged in grape vine production indicted that on average they can produce between 1 to 2 boxes of grapes at a minimum and others produces maximum of 4 boxes equaling 200 kilograms as a group.

Type of Grape Residues and Their Current Usage:

The types of grape residues generated after wine making include; seeds and grapes cover. These residues currently have less usage as most of them are thrown in the banana plantation for manure others are fed to pigs, ducks and hens. However, it was further reported that there is no significant usage of these residues.

Challenges Faced in the Usage of Residues and Adapted Solutions:

Study participants reported that the grapes residues do not fatten the pigs; they do not increase on the fertility of the soil in the gardens. Further the study was informed that the seed residues are malnourished. On top of that the grape residues were reported to have an alcoholic smell especially at the very spot where they are thrown in the banana gardens. Participants further reported that grape residues itch the hands of the farmers as they are serving them to pigs but have no effect on pigs. One participant said; *'At first rumors said that residues would make pigs drunken but to me, they have no effect on my pigs'*

Attempts to Solve the Challenges:

Grape Farmers have tried a number of adaptations towards the use and management of grape residues. In the first instance farmers reported that they mix grape residues with other substance like chachu which mixture they feed to the chicken and it is expected to add value to the hens, ducks and even the pigs.

On the same note farmers indicated a strong willingness to acquire skills in the processing of wine residues. The other willingness was on dumping residues in one place so as to reduce on the smelly substance everywhere in the plantation.

The study participants were of the view that they were willing to engage in any activities that could add value the residues. One way the study team suggested and farmers were willing to adopt was making grape wine residue as an ingredient in making bread and chicken feed. Study participants suggested that the Grapes residues should be little and add in other chemicals so as to reduce the alcoholic substance from the grapes

Market Gaps in the Current Ingredients Used in Bread Making and Livestock Feeds (Pigs, Poultry and Dairy Cattle) Feed Mixing

The study intended to document the current ingredients used in making bread and the potential gaps with those ingredients especially nutritional values and the shelf life of the products.

Type of feeds Commonly Available on the Market:

From the study findings processors of feeds pointed out that the types of feeds they process include; chicken mash, Layer mash, broiler mash, growers and dairy meal.

On the side of bakeries, the types of bread mentioned were coconut bread and swallow bread. Feed processors on the other hand indicated that they were using the following ingredients to make animal feeds. These were mentioned as; Cotton seeds cake, Sun flower cake so as to reduce fats on layers, Shells of snails, calcium [livestock and animals], coconut and Mable stones.

On the side of bread manufacturers', the ingredient mentioned included; yeast, sugar, Calcium, wheat flour, salt, milk powder and food colour.

Alternatives Apart from the Conventional Ingredients Above:

The commonly mentioned alternative ingredients were: Bones, mukene, Soya beans, and Protein concentrates imported from other countries.

Bread processors mentioned no alternative ingredients used as there is ease of access of conventional raw materials and a steady supply provided by their suppliers. The only alternative strategy was changing the supplier if at all quality of raw materials was affected.

Reasons for Preference of the Commonly Used Ingredients:

Farmers reasoned that most of the ingredients are easily available on the Ugandan market such as coconut which is got from Congo and sunflower and cotton seeds which are got from Tanzania

Shelf Life of the Animal Feeds and Bakery Products:

With feeds processors the mentioned shelf life for the types of feeds lasting between 3-4 months if the products are kept in a clean and hygienic environment while bakery products were said to last between 5-6 days with a maximum shelf life of 7 days.

Willingness to Use Locally Available Alternative Ingredients:
Most of the study participants said yes, especially if the farmers appreciate the results and moreso reduce on use of more preservatives like Bavanite and lip sin.

Strategies To Popularize Use of Grape Pomace Flour in Bread Making or Livestock Feed (Willingness to Market the Pomace Flour):
Study participants mentioned strategies of popularizing the grape pomace flour as: Advertising on radios, television and other sources so that the consumers are aware of the product, proving if the product is efficient for use, Sampling the feed stocks to the farmers so that they can be aware of the product, and Giving samples of flour to people and other factories so as to know their feedback about the product.

Recommendations on Packaging and Branding of The Grape Pomace Flour:
The suggested recommendations on packing and branding from the respondents were that; the flour should be packaged in only two ways; paper material in 2 to 5kg or so and industrial use sacks of 35kg to 50kg; nutrient should be of quality and put evidence of the nutrients on the packaging material.

Perceptions of Customers of Products Made of Grape Pomace Flour as One of The Ingredients (Bread Consumers and Livestock Farmers)
Animal Feed Processors Perceptions:
While probed to the processors of animal feeds about the use of pomace products in the production process, processors intimated that customer would be willing to use the product especially if the ingredient has the following attributes thus; taste quality and good packaging material.

Bakery Product Processors Perceptions:
Processors of bakery products felt that if pomace flour makes the bread to retain the good taste, scent, texture and shelf life which determines the demand of bread, consumers will be much willing to take it.

Local People/Farmers Perceptions:
Farmers affirmed their willingness to use products made out of pomace flour (eat bread and mix flour in feeds). Reasons given were; the process of making wine is clean and processor can be extra careful on residue cleanliness and first boil the residues to kill germs, as we use products residues will be bought for processing and have value. However, participants noted that the dried and ground residues into flour should be analysed to know chemical content before used as ingredients of food or feed.

DISCUSSION OF FINDINGS

Findings from the survey revealed significant variation in land holdings among grape farmers, reflecting diverse socioeconomic backgrounds. In parallel, Mhetre's [5] study found that the size of agricultural land holdings in the region directly impacted resource availability. Larger landowners were more likely to contribute substantially to residue supply, aligning with our findings. Furthermore, two distinct grape harvest seasons in Mbarara City offer consistent

residue generation opportunities, mirroring the findings of similar agricultural regions. However, our survey pointed out that aggregation efforts may be needed for large-scale processing, mirroring the findings of Chavan's [2] study.

The survey findings underlined the underutilization of grape residues, with most being used as manure or livestock feed. This trend aligns with findings from Costa's research, which noted a similar underutilization pattern in agricultural residues [3]. Challenges faced by grape farmers, such as the ineffectiveness of residues in fattening pigs and their alcoholic smell, resonate with concerns highlighted in Costa's [3] study. Innovative approaches and a willingness to explore alternatives were also noted from the survey findings, reflecting observations in Boff's [1] research.

The types of feeds available in the market appear relatively standard. However, the diversity of ingredients used in livestock feed processing highlights the potential for incorporating Grape Pomace Flour as a unique and nutritious component, a trend noted in Mnisi's [6] study.

Farmers' preference for conventional ingredients is based on their ready availability in the Ugandan market. Accessibility and affordability considerations also align with similar observations from the survey. The relatively short shelf life of bakery products emphasizes the importance of maintaining product freshness thus Grape Pomace Flour's potential to enhance taste, scent, and shelf life could be a selling point for bakeries [4].

The survey presented various strategies for popularizing Grape Pomace Flour, including advertising, sampling, and gathering feedback. These strategies align with established marketing and promotion best practices, emphasizing the importance of raising awareness and building trust among consumers.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The findings of the market research survey present a compelling case for the integration of Grape Pomace Flour into food and livestock feed applications in Mbarara City, Uganda. To harness this potential, the recommended initiatives, including awareness campaigns, value addition through training, collaboration promotion, quality assurance, and packaging standards adherence, are critical. Implementing these recommendations will not only benefit local grape farmers but also contribute to sustainable growth in the local agricultural and food industries since it is through collective efforts and strategic actions that the full potential of Grape Pomace Flour can be realized, providing economic opportunities and nutritious ingredients for the community.

Recommendations

The market research survey conducted in Mbarara City, Uganda, has provided valuable insights into the potential utilization of Grape Pomace Flour in food and livestock feed applications. Based on the findings, below are the recommendations that can pave the way for sustainable use of Grape Pomace flour as a food and livestock feed supplement;

Promote Awareness:

One key recommendation is to develop a comprehensive marketing and awareness campaign. This campaign should target consumers, farmers, and processors, educating them about the benefits and uses of Grape Pomace Flour. The findings revealed that many stakeholders are unaware of the potential of grape residues and their transformation into value-added products. Raising awareness can bridge this knowledge gap and create a market for Grape Pomace Flour.

Value Addition:

To maximize the potential of Grape Pomace Flour, it is essential to establish training programs for farmers. These programs should focus on residue management and the transformation of grape residues into quality Grape Pomace Flour. The willingness of farmers to explore alternative solutions, as highlighted in the survey, can be harnessed through skill-building initiatives. This step not only adds value to grape residues but also empowers local farmers with new income-generating opportunities.

Collaboration:

Fostering collaboration between grape farmers, processors, and the Grape Pomace Flour industry is another vital recommendation. A consistent supply chain is crucial for the success of this value addition endeavor. By working together, stakeholders can ensure a steady and reliable flow of grape residues to processing units. This collaboration can also facilitate knowledge exchange and best practices in residue management and pomace flour production.

Quality Assurance:

The survey findings underscore the importance of strict quality control measures during the production of Grape Pomace Flour. Ensuring consistent quality and safety is vital to gain consumers' trust and maintain product integrity. Quality assurance measures should encompass every stage of production, from residue collection to flour processing. This commitment to quality will be a key driver of consumer confidence in Grape Pomace Flour.

Packaging and Labeling:

Adhering to packaging recommendations is crucial. Grape Pomace Flour should be packaged in materials such as paper bags or industrial sacks, with clear and informative labeling. Nutrient information should be prominently displayed on packaging materials to provide consumers with essential information about the product. Transparent packaging and accurate labeling contribute to consumer trust and informed decision-making.

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