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Preface

The Scientific Project Colloquium offers a platform for publishing Diploma Science final year projects (FYP). The objective is to effectively distribute research findings throughout all scientific disciplines. The primary objective of including final year projects into the course curriculum is to encourage students to put their theoretical knowledge into practical applications.

We would like to express our gratitude to our primary establishment, the Faculty of Applied Sciences and Universiti Teknologi MARA, Perak Branch, for their invaluable assistance.

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PRELIMINARY STUDY ON FORMULATION OF GOAT MILK WITH FREEZE DRIED FRUIT POTENTIANALLY FOR PREGNANT WOMEN

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Abstract: A preliminary study on potential formulation of goat milk with freeze-dried fruits for pregnant women is the study to explore the formulation which can remove or to lessen the 'goaty taste' of the goat milk itself. Goat milk's nutritional advantages, including digestibility and unique fatty acids compositions complement the benefits of freeze-dried fruit which retain essential nutrients and flavours; hence, it will enhance the nutrition of the formulation. The optimal ratio for goat's milk formulation is 6:4, comprising 6g of goat's milk and 4g of dried fruit. Following several testing and modifications to eliminate the 'goaty taste' and enhance the overall taste, the optimal formulation of goat milk is 6:2:0.5:0.5:1, corresponding to goat milk powder, honeydew, dragon fruit, avocado, and natural honey, respectively.

Keywords: *Goat milk, freeze-dried fruits, goaty taste, pregnant women.*

INTRODUCTION

The importance of maternal nutrition in fostering a healthy pregnancy is a crucial aspect that should be emphasized during prenatal consultations. Proper nutrition during pregnancy is crucial for fetal growth and development, as well as for maternal health. Furthermore, it is crucial to acknowledge that the food choices taken during this period can exert lasting impacts on the health of both the mother and her progeny. A significant number of pregnant women depend on their healthcare providers, including obstetricians, midwives, and general practitioners, for nutritional guidance during regular prenatal appointments. A mere minority of pregnant women proactively seek guidance from nutritionists, which is significant. Notwithstanding the considerable amount of information provided during prenatal consultations, nutritional recommendations are often disregarded (Jamie *et. al*., 2022). Pregnant women are advised to emphasize the nutritional content of their diet by selecting meals abundant in nutrients, vitamins, and minerals. Calcium is regarded as an essential nutrient for pregnant and lactating moms, as it facilitates the development and growth of the fetal skeletal system, including bones and teeth (Inmaculada *et. al*., 2008).

Milk and dairy products are the most abundant natural sources of calcium. Their consumption enhances the nutritional quality of the human diet during the growth phase due to their high concentration of bioavailable calcium and other essential components. The major source of calcium ingested by pregnant women is milk. Studies indicate that goat's milk is more advantageous for pregnant women due to its higher protein and calcium content compared to cow's milk (Heinlen, 2004; Widson *et. al.*, 2023).

However, in the present market environment, cow milk prevails, but the accessibility of goat milk is restricted, offering consumers just a limited selection. Hence, this study seeks to develop a goat milk composition with freeze-dried fruits that are appropriate for pregnancy. Goat milk is praised for its numerous health advantages due to its unique makeup. It has reduced lactose content relative to other milks and is abundant in oligosaccharides, which support a healthy gut microbiome and facilitate crucial brain and nervous system development. This distinctive carbohydrate composition not only helps protect against detrimental infections but also plays a key role in cognitive development, particularly throughout early life (Turkmen, 2017). The taste of goat's milk is inferior to that of cow's milk, making it less appealing to many people. To alleviate the unpleasant flavor, this goat's milk is fortified with assorted dried fruits to enhance its taste and increase its nutritional benefits for pregnant women.

METHODOLOGY

Materials Preparation

All necessary chemicals and equipment, including water (H2O), freeze-dried fruit powder (avocado, honeydew, dragon fruit, sugar cane), natural honey powder and Suffy Pure Goat (goat milk powder). Ensure the availability of a spoon, beaker, kettle, thermometer, digital scale, ten tiny cups, Kleenex, a marker pen, and a small zip lock bag.

Sample Preparation

Measure 250 mL of drinking water and heat it in a beaker until it attains the required temperature, then deactivate the heat source. Transfer the heated water into a separate beaker and permit it to cool to 40°C, while checking the temperature with a thermometer. Once the water attains a temperature of 40°C, incorporate the goat milk powder and freeze-dried fruit in accordance with the proportions indicated in table 1, and stir the mixture with a glass rod until completely dissolved. Optionally, filter the mixture to eliminate any undissolved particulates. Transfer the mixture into a cup, and after that assess the smell and taste.

Table 1: Table for mixture and ratio of goat milk and freeze-dried fruits

Sample	Sample mixture	Sample ratio (10 g)
A	Goat milk: Avocado: Natural honey	6: 3: 1
B	Goat milk: Honeydew: Natural honey	6: 3: 1
C	Goat milk: Dragon fruit: Natural honey	6: 3: 1
D	Goat milk: Dragon fruit: Honeydew: Natural honey	6: 2: 1: 1
E	Goat milk: Dragon fruit: Honeydew: Avocado: Natural honey	6: 2: 0.5: 0.5: 1

FINDINGS

Goat milk is white and has a more pronounced flavor than cow milk. Goat's milk possesses a lower concentration of fat globules compared to cow's milk, yielding a more refined texture. The taste of goat's milk is more distinct than that of cow's milk, perhaps restricting consumer acceptance of its derivatives. To alleviate the odor of goat milk by applying different amounts of freeze-dried fruit powder. A significant improvement in flavor and overall acceptability was seen in goat milk infused with freeze-dried fruits compared to conventional goat milk (control). Moreover, goat milk infused with freeze-dried fruit exhibited a more pronounced scent than traditional goat milk.

According to the prior study, the optimal ratio of goat milk to fruit flavor is 6:4, with 6 representing goat milk and 4 representing fruit flavors. In turn, the formulation will continue with a ratio of 6:4, utilizing various freeze-dried fruits in place of fruit flavoring. Table 2 below illustrates the flavor profile of the goat milk and freeze-dried fruit mixture. The optimal combination to mitigate the odor and goaty flavor of the milk is Sample E, comprising goat milk, honeydew, dragon fruit, avocado, and natural honey.

The optimal milk flavor is determined through a taste test involving over 20 participants. Seventeen out of twenty individuals selected sample E as the most effective formulation for eliminating the intense taste and odor of goat's milk.

In addition to mitigating the potent flavor and aroma of goat's milk, freeze-dried avocado, honeydew, and dragon fruit are rich in essential minerals beneficial for the health of pregnant women and fetal development. For instance, folate, potassium, magnesium, and iron (Chauhan *et. al.*, 2021; Mardigan *et. al.*, 2019). Consequently, it may enhance the nutritious content of goat's milk.

Table 2: Taste/Smell of different formulation for goat milk and freeze-dried fruits.

Sample	Sample mixture	Sample ratio (10 g)	Taste/Smell
A	Goat milk: Avocado: Natural honey	6: 3: 1	It does not effectively reduce the goaty taste and smell.
B	Goat milk: Honeydew: Natural honey	6: 3: 1	Delicious, sweet and the aftertaste is not too strong.
C	Goat milk: Dragon fruit: Natural honey	6: 3: 1	It does not effectively reduce the goaty taste and smell.
D	Goat milk: Dragon fruit: Honeydew: Natural honey	6: 2: 1: 1	Delicious, sweet and the aftertaste is not too strong.
E	Goat milk: Dragon fruit: Honeydew: Avocado: Natural honey	6: 2: 0.5: 0.5: 1	It is tasty and sweet, reduces the goaty taste effectively.

CONCLUSIONS

In conclusion, goat milk, distinguished by its white color, smooth texture, and strong flavor, often faces consumer resistance due to its potent taste and scent. The addition of freeze-dried fruit powder has proven effective in improving the flavor and scent of goat milk. Based on the results, adding various amounts of freeze-dried fruit powders to goat milk significantly enhanced its flavor. Sample E, comprising goat milk powder, honeydew, dragon fruit, avocado, and natural honey in a ratio of 6:2:0.5:0.5:1, yielded the most favorable outcomes regarding olfactory and gustatory masking among the evaluated combinations. Taste tests revealed a distinct preference for this combination, with the majority of participants deeming the sample E mixture both delectable and devoid of the characteristic goat milk flavor. The idea of formulating freeze-dried flavored goat milk proves effective in mitigating the goaty taste and odor present in the milk, so rendering it a more universally embraced and pleasurable product for consumers.

COMPLIANCE OF ETHICAL STANDARDS

Not applicable.

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SITI BASRIYAH SHAIK BAHARUDIN
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