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EVALUATING HORSE GRAM (MACROTYLOMA UNIFLORUM) EXTRACT FORTIFIED COW MILK BASED ON SENSORY PERCEPTION

[1]K. Bhuvaneswari and [2]Park Y.W

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Abstract

This study aimed to develop a fortified cow milk using horse gram extract, a pulse crop known for its richness in protein, minerals, vitamins, and non-nutritive bioactive substances. The proximate composition of the horse gram extract was measured and blended with pasteurized cow's milk at different levels before conducting a sensory evaluation analysis to determine the acceptability of different blends. The results showed that milk fortified with 40% horse gram extract was the most pleasing in terms of color, appearance, flavor, taste, and consistency. The addition of horse gram extract to cow milk provides an excellent opportunity to create an anti-obesity diet option that could have significant commercial reach worldwide.

Introduction

Horse gram (Macrotyloma uniflorum) is a pulse crop that contains high levels of protein, minerals, vitamins, and non-nutritive bioactive substances. In addition to its nutritional importance, horse gram has been linked to reduced risk for various diseases due to the presence of these bioactive substances. This study explores the use of horse gram extract as a fortifying agent for cow's milk to create a beverage with added nutritional value. Researchers measured the proximate composition of the horse gram extract and blended it with pasteurized cow's milk at varying levels. Sensory evaluations were conducted to determine the acceptability of the different blends. The results showed that milk fortified with 40% horse gram extract was the most acceptable based on color, appearance, flavor, taste, and consistency. The addition of horse gram extract to cow milk provides an opportunity to create an anti-obesity diet option that could have significant commercial reach worldwide. This study contributes to the exploration of alternative sources for food fortification that could lead to significant health benefits.

Materials and methods

The present work was carried out in the Model Dairy Plant, Department of Livestock Products Technology (Dairy Science), Madras Veterinary College, Tamil Nadu Veterinary and Animal Sciences University, Chennai - 600 007. Pasteurized cow milk was obtained from the Model Dairy Plant, Department of Dairy Science, Madras Veterinary

[1] Associate Professor, Department of Livestock Farm Complex Veterinary College and Research Institute, Tirunelveli
[2] Tamil Nadu Veterinary and Animal Sciences University

College. The milk from dairy plant was used for the preparation of horse gram (*Macrotyloma uniflorum*) extract fortified milk. Fresh and clean horse gram (*Macrotyloma uniflorum)* seeds were purchased from local market; Chennai was used as a source of horse gram extract in this study. Horse gram extract was prepared according to the procedure described by Preeti verma *et al*., (2014) as shown in Fig.-1

Figure -1 Schematic representation of steps in preparation of Horse gram extract

25 g of horse gram
↓
Soaked in water for 16 hours
↓
Blanched for 15 minutes
↓
Dehulled manually
↓
Ground for 5-7 minutes
↓
Sieved through muslin cloth
↓
Blended with 300 ml of water
↓
Boiled for 10 minutes
↓
Cooled at room temperature
↓
Horse gram extract (180 ml)

The horse gram extract was analysed for moisture, fat, protein, carbohydrate, ash, crude fibre and tannin. Carbohydrate was determined by the difference. All determination was carried out using standard procedures (AOAC, 2000). The analytical values were evaluated from the mean of three determination of the sample.

Fortification of cow milk with horse gram extract

The cow milk was fortified with horse gram extract at 30,40,50,60, 70 percent levels as shown in Table -1, therefore the best proportion was selected from based on the sensory test. The cow milk was kept as control whose fat content was 3.5 percent and Solids not fat was 8.5 percent.

Table -1 Fortification of cow milk with horse gram extract

Samples	**Milk %**	**Horse gram extract %**
Control	100	-
S1	70	30
S2	60	40
S3	50	50
S4	40	60
S5	30	70

The sensory evaluation for the different proportions of the horse gram extract fortified milk were carried out by a semi trained panel of judges using 9 point hedonic scale as described by (Hue,1993). The values were then tabulated and the results were interpreted accordingly. Based on the sensory evaluation, the best proportion of horse gram extract fortified milk was selected for the analysis.

Results and Discussion

Table -1 shows the proximate composition of horse gram extract in which the fat percent was 0.25 grams percent, fibre 0.80 grams percent and protein and carbohydrate was 3.64 and 3.19 grams percent respectively.

Table -2 shows the sensory evaluation scores of the control and horse gram fortified milk samples (S1, S2, S3, S4, S5) using 9 – point hedonic scale

COLOUR AND APPEARANCE

The colour and appearance of Control, S2, S3 and S4 was almost similar and they gained a score of 8.08±0.27, 8.33±0.17, 8.33±0.17 and 8.08±0.27 of which S2 and S3 were ranked highest among the variations. S1 and S5 gained a score of 7.08±0.27 and 7.00±0.37 for colour and appearance which was ranked lowest among the variations. Highly significant difference ($P \leq 0.01$) was found between the treatments. The colour and appearance of the samples S2 and S3 was more liked by the panellists.

TASTE

The control and sample S2 had gained a similar score of 8.58±0.20 and 8.58±0.15 for its taste which was ranked the highest among the variations. This was due to addition of 40 percent horse gram extract to the milk which blended completely with the milk.

FLAVOUR

The flavour score of S2 was 8.50±0.18 and it was ranked the highest among the variations.

Highly significant difference ($P \leq 0.01$) was found between the treatments. The flavor of sample S2 was more liked than the flavours of other samples among the panelists because of the light odour and taste of horse gram. Jothylingam and Pugazhenthi (2013) reported that low calorie herbal flavoured milk with 5 percent of aloevera extract was most acceptable based on sensory evaluation.

CONSISTENCY

The consistency score of the samples S1, S2, S3, S4 was almost similar and obtained a score of 7 and above among the variations. The control sample has a score of 8.00±0.29. The consistency scores of 70 percent horse gram extract fortified milk was lowest at 6.42±0.20. This shows that higher level of addition of horse gram extract in milk showed a lower consistency score. This is in accordance with the observations made by Riberio et al 2014 that mango and papaya flavour formulation containing 62.7 percent soy extract based beverage was found to be good at consistency. Hence sample S2of 40 percent addition of horse gram extract was found to be acceptable.

OVERALL ACCEPTABILITY

The overall acceptability score for control and sample S2 was similar when compared to the other variations. The score for other samples were lower when compared to control and S2. This showed horse gram extract fortified milk with 40 percent level was liked by the panelist than the other samples

Conclusion

In this study cow milk was fortified with the horse gram extract and subjected to sensory evaluation. Based on the sensory evaluation it was found that horse gram fortified milk with

40 percent horse gram extract (S2) was found to be more acceptable by the panellist than the other samples. The milk developed can be used as diet for obese and fat conscious people because horse gram exerts antiobesity properties.

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