

Sensory and microbial properties of beverage from malted finger millet, cucumber and carrot juice and effect on fasting blood sugar and lipid profile of rat

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Introduction

- Food monotony is a serious psychological problem being faced by those suffering from diabetes, as they are constrained from eating a lot of foods
- The conventional malt drink is among foods diabetic patients are advised to avoid
- Malt drink from finger millet, carrot and cucumber juices may serve as alternative.

Objectives : To evaluate sensory and microbial properties of roasted and unroasted finger millet finger malt drink supplemented with 0%, 25% carrot and/or cucumber juice and effect on fasting blood glucose and lipid profile of rats

Materials and methods

- Finger millet (*Eleusine coracana*) was purchased from Jos, Plateau state. Cucumber (*Cucumis sativus*), Carrot (*Daucus carota*) were purchased from Ogige market Nsukka, Enugu state.
- The malt drinks was processed as shown in Fig 1. and evaluated for microbial and sensory properties
- Thirty rats separated into four test groups and one control group tested for fasting blood glucose using blood glucose monitoring system (ACCU-CHEK Sensor; Roche Diagnostics GmbH, Mannheim, Germany)
- Experimental animals were assayed for Serum lipid profile (serum cholesterol).



Plate 1: Finger millet grain



Plate 2: 48 h malted finger millet

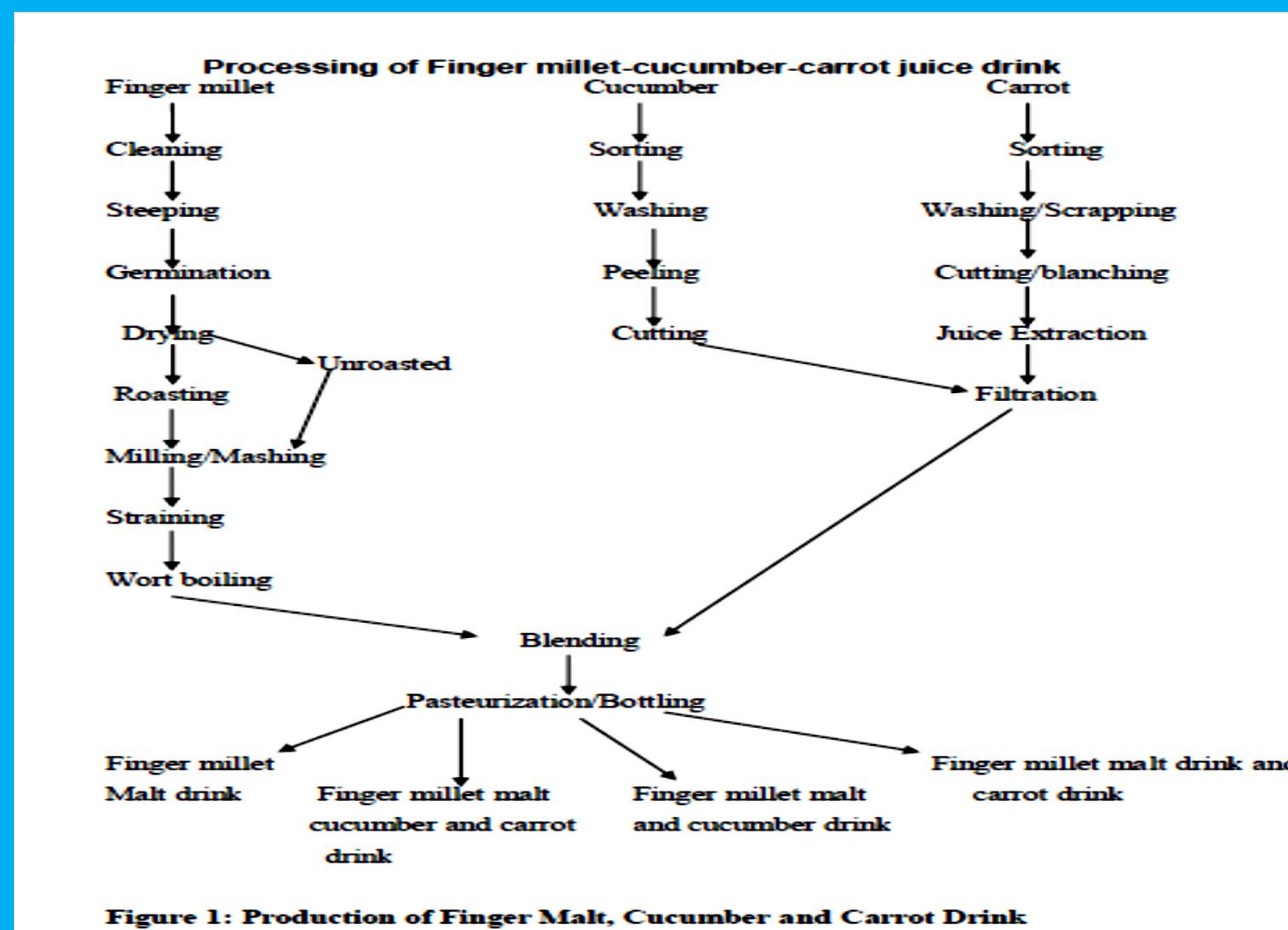


Figure 1: Production of Finger Malt, Cucumber and Carrot Drink

Results and Discussion

Table 1: Sensory scores of roasted finger millet malt-cucumber - carrot and unroasted finger millet malt-cucumber- carrot drinks

Samples R/U:Cu:C	Colour	Appearance	Flavour	Taste	After-Taste	Overall Acceptability
R100:0:0	6.75±0.25 _b	6.70 ±0.27 ^c	6.20 ±0.29 _a	6.50 ±0.32 ^{bc}	6.30 ±0.27 ^{bc}	6.50 ±0.40 ^{bc}
R50:25:25	6.20±0.24 _{ab}	5.90 ±0.25 ^{abc}	5.55 ±0.37 ^a	5.40 ±0.28 ^a	5.40 ±0.31 ^a	5.70 ±0.32 ^{ab}
U100:0:0	6.25±0.30 _{ab}	6.45 ±0.28 ^{bc}	7.35 ±0.25 ^b	7.05 ±0.32 ^c	6.80 ±0.25 ^c	6.95 ±0.30 ^c
U50:25:25	6.10±0.28 _{ab}	6.10 ±0.28 ^{bc}	6.15 ±0.31 ^a	6.25±0.37 ^a	6.10±0.35 ^a	6.55 ±0.29 ^{bc}

Values on the same column with different superscripts are significantly different (p<0.05) different
Key: F= finger millet malt; Cu = cucumber juice; Ca = carrot juice; R= roasted finger millet malt drink; U= unroasted finger millet malt

- Total viable counts of the malt drinks ranged from 1.13 -2.93 x 10² Cfu/100ml while overall acceptability varied from 6.30 - 6.95 and were below the maximum allowable limit (10³/mL of Cfu/g). The overall acceptability showed that the malt drink was moderately liked by the panelists.
- Rats fed sample containing 50% unroasted finger millet malt drink, 25% of cucumber and 25% carrot juice had the highest reduction in fasting blood sugar level (87%) and highest increase in high density lipoprotein level.
- Formulated malt drink caused a reduction in cholesterol, low density lipoprotein, very low density lipoprotein and triglyceride of rats

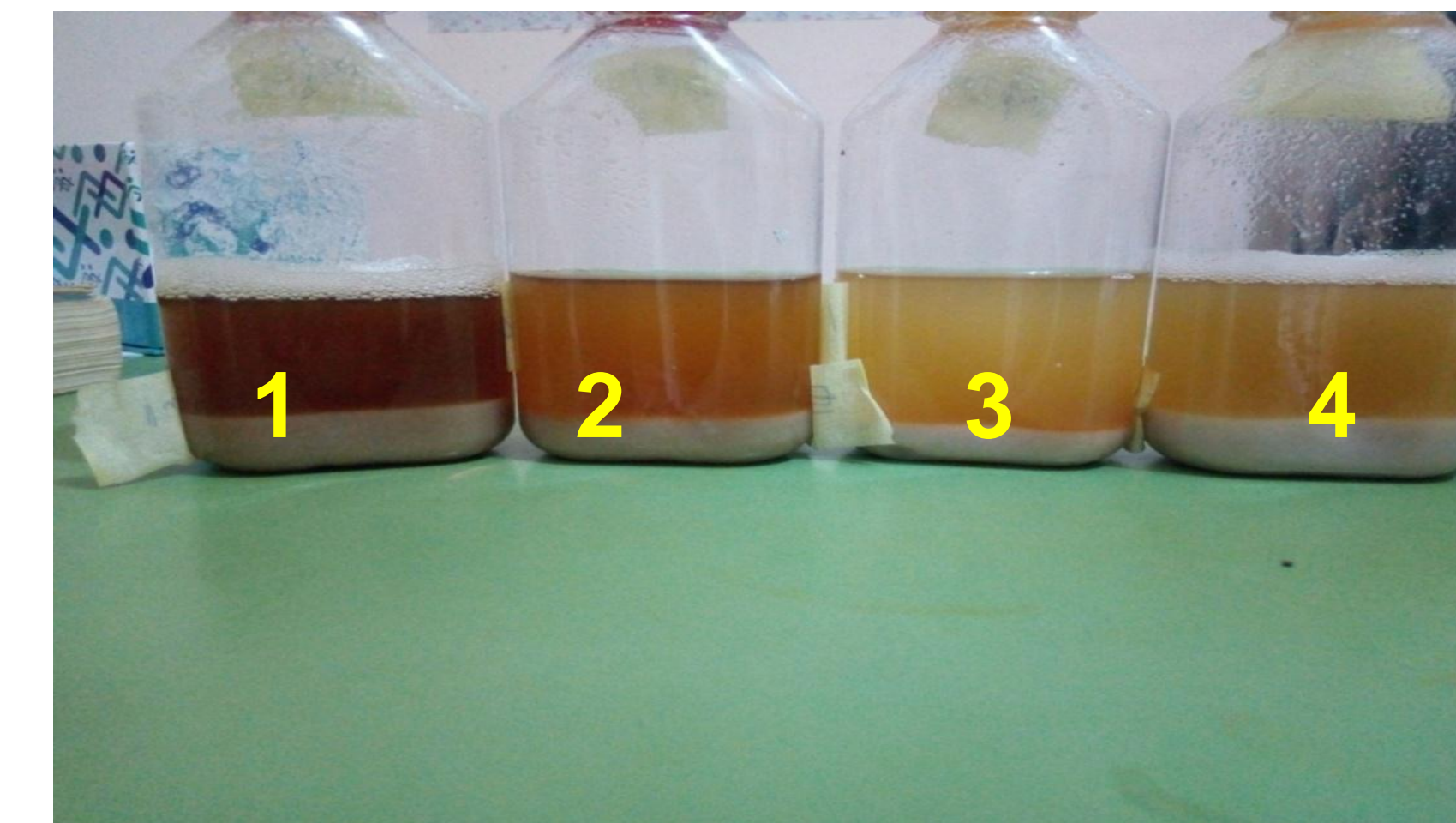


Plate 3: Malt drinks samples used for bioassay

- 1=100% roasted finger millet malt drink
- 2= 50% roasted finger millet malt, 25% of cucumber and 25% carrot drink
- 3.= 100% unroasted finger millet malt drink
- 4= 50% unroasted finger millet malt, 25% of cucumber and 25% carrot drink

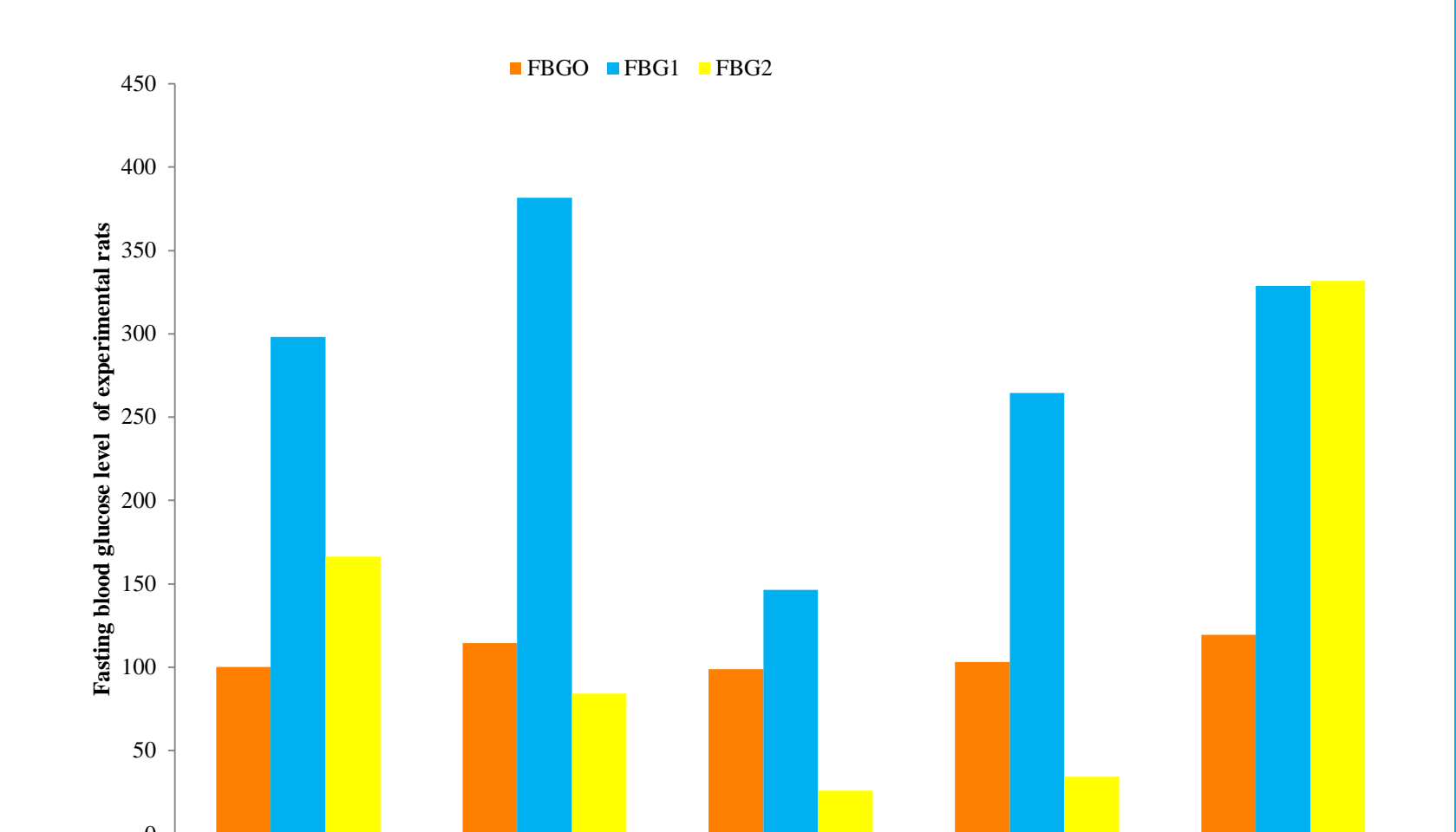


Fig 1 Fasting blood glucose of the diabetes induced rats fed roasted/unroasted finger millet malt-cucumber – carrot drinks

Table 2: Lipid profile of diabetes induced rats fed drinks from roasted and unroasted finger millet malt-cucumber - carrot juice

Rat group	Chol	HDL	VLDL	LDL	TGA
1	81.30 ^b ±4.90* (61.07 ^a ±1.06)**	32.67 ^b ±2.39* (50.00 ^c ±4.67)**	56.09 ^c ±0.24* (8.17 ^a ±0.36)**	24.84 ^b ±0.46* (20.24 ^b ±1.17)**	280.48 ^d ±1.19* (40.84 ^a ±1.82)**
2	110.60 ^c ±0.70* (64.74 ^b ±11.16)**	42.20 ^c ±4.64* (50.34 ^c ±0.34)**	17.91 ^b ±0.08* (9.61 ^a ±0.58)**	42.35 ^c ±0.44* (12.93 ^a ±5.97)**	89.55 ^c ±0.39* (48.03 ^b ±2.90)**
3.	59.40 ^a ±3.96* (59.38 ^a ±5.46)**	30.34 ^b ±1.67* (34.20 ^b ±2.01)**	15.70 ^b ±0.08* (8.96 ^a ±0.30)**	16.23 ^a ±4.95* (13.35 ^a ±2.36)**	78.51 ^b ±0.39* (44.78 ^{ab} ±1.49)**
4.	81.53 ^b ±17.28* (56.81 ^a ±3.26)**	16.17 ^a ±0.00* (34.36 ^b ±1.24)**	18.70 ^b ±0.08* (9.33 ^a ±0.67)**	37.84 ^c ±15.87* (21.44 ^{ab} ±3.18)**	93.49 ^c ±0.39* (46.64 ^{ab} ±3.35)**
5.	53.32 ^a ±3.96* (70.95 ^c ±4.15)**	35.36 ^b ±2.36* (26.00 ^a ±0.00)**	10.26 ^a ±0.36* (32.41 ^b ±1.01)**	15.09 ^a ±2.96* (25.34 ^c ±2.80)**	51.28 ^a ±1.79* (162.13 ^c ±5.13)**
STD	95.00-163.81 (80.00-129.52)**	38.33-63.33* (33.33-66.67)**	10.05-21.62* (9.51-21.62)**	32.75-97.30* (20.28-81.55)**	64.86-147.03* (43.78-108.11)**

Rat groups- 1. = diabetes induced rat fed with 100% roasted finger millet malt drink R100:0:0; 2. = diabetes induced rat fed with 50% roasted finger millet malt, 25% of cucumber and 25% carrot drink R50:25:25; 3. = diabetes induced rat fed with 100% unroasted finger millet malt drink U100:0:0; 4. = diabetes induced rat fed with 100% unroasted finger millet malt drink, 25% of cucumber and 25% carrot drink U50:25:25; 5. Control= diabetes induced rats fed normal rat chow as control.
*-parameter level before treatment; **-parameter level after treatment. *STD- Standard reference range of lipid profile in normal rats at 10 and 12 wks, respectively

Conclusion

The study established that acceptable malt drink can be produced from blends of malted finger millet, carrot and cucumber juice which can aid in management of diabetes.