SOME PHYSICAL PROPERTIES OF DRIED *TYMPANOTOSUS FUSCATUS* AND *PACHYMELANIA AURITA* PERIWINKLE MEAT

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ABSTRACT
Periwinkle serves as food mostly among people in coastal areas in Nigeria, making it an essential ingredient in preparing various delicacies. The processing of periwinkle has been through traditional methods by using a knife and needle to extract the meat from its shell. Traditional periwinkle processing is tedious, hazardous, time-consuming, unwholesome, and uneconomical. This study determines the effect of drying methods (cabinet and oven drying) on the physical properties of periwinkle types. The intention is to help solve the challenges of machine designing, processing, handling, and storing periwinkle. The periwinkle meat samples were dried using the cabinet and oven drying methods. The drying of the two varieties of periwinkle meat samples (Tympanotosus fuscatus and Pachymelania aurita) was at about 105ºC for 3 hours in an electric oven dryer. The ambient temperature during oven drying was 31ºC, and the ambient relative humidity of 57%. While using the cabinet dryer, the temperature was at about 60ºC for 10 hours, with ambient temperature and relative humidity at 33.3ºC and 61%, respectively. Some dried periwinkles were selected from the samples to determine the geometrical and gravimetric properties of the two periwinkle varieties. The ANOVA results showed a significant difference ($p<0.05$) in the physical properties of the varieties between the fresh sample, oven-dried, and cabinet-dried samples. Hence, oven and cabinet drying methods are recommended for appropriate drying of the periwinkle meat before storage.The determined physical properties from the study can be used as input parameters for designing efficient processing equipment for periwinkle meat.

KEYWORDS: Periwinkle, Oven, Cabinet, Geometric, Gravimetric.

1. INTRODUCTION
Periwinkles are soft-body shellfish found mostly in brackish and coastal regions of the sea. They are gastropods of the phylum *Mollusca*. They are found in lagoons, estuaries, mangroves, and swamps in Nigeria. The two genera common in Nigeria are *Tympanotosus fuscatus* and *Pachymelania aurita* (Job and Ekanem, 2010; Bob-Manuel, 2012). Periwinkle serves as food in most Nigerian homes, making it an essential ingredient in preparing various delicacies, especially among people in the coastal areas where it is found (Bob-Manuel, 2012). They are used for cooking delicacies such as periwinkle soup, native soup, *afang* soup, *ekpang nkukwo*, *ofe nsala*, okra soup, etc. It can be cooked with or without its shell. The mouth extracts the meat from the shell when cooked with the shell. The meat can also be removed from the shell using either a toothpick, needle, or nail. The two species are morphologically different (Ekop *et al*., 2019). *Pachymelania aurita* develops sharp spines' broader aperture, although its sharpness depends on the organism's age; the

older it becomes, the more the spines get blunt and thicker. The *Tympanotosus fuscatus* is characterized by turreted, granular, and spiny shells with tapering ends (Iboh *et al*., 2015).

There are works of literature on periwinkle; although a substantial amount of relevant literature is on other species of the snail family. Ogungbenile and Omowole (2012) studied bacteriological and proximate analysis of periwinkles from two Nigeria Creeks. They worked on the meat's chemical functional and amino acid composition of periwinkle (*Tympanotonus fuscatus*). Iboh *et al*. (2015) reported on the microbiological, proximate, mineral, and heavy metal composition of freshwater snails from Niger Delta Creek in Nigeria. Ekop *et al.* (2019) published a comparative analysis of the proximate composition of two varieties of periwinkle relevant to its processing equipment design and reported the effects of processing factors and conditions on the cracking efficiency of the two types of periwinkle.

Over the years, the processing of periwinkle has been through traditional methods: using a knife to trim the tapering end and then using a sterilized needle to extract the meat from its shell (Odu *et al*., 2010). This makes the processing of the periwinkle tedious, hazardous, time-consuming, unwholesome, and uneconomical, with a high level of drudgery. This has also reintroduced dirt, germs and contaminants, thereby reducing periwinkle meat quality. There is a need to develop a machine for its efficient processing, considering the enormous potential of periwinkle (Ekop *et al*., 2019). Drying is a mass transfer process of removing water or solvent by evaporation from the fresh periwinkle. This process is often used as a final production step before the final processing or packaging. A heat source and an agent to remove the vapor produced by the process are often involved. There are different methods of periwinkle meat drying, such as sun drying, freeze-drying, solar drying, oven drying, and cabinet drying. Using hot air flowing over the food is the most common way of transferring heat to dry a material (Cruz *et al*., 2015; Moruf and Lawal-Are, 2015). The essence of drying includes preserving food and increasing its shelf life by reducing the water content and water activity, thereby avoiding the need for refrigeration (Guiné, 2010). This study aims to determine the effect of cabinet and oven drying on the physical properties of some periwinkles (*Tympanotosus fuscatus* and *Pachymelania aurita*). The data obtained from the study would help solve the challenges of machine designing, processing, handling, and storage of periwinkle meat samples.

2. MATERIALS AND METHODS

2.1 Sample preparation

The periwinkle samples were procured from a local Itu waterfront market in Akwa Ibom State, Nigeria. The periwinkle samples were washed, cleaned, then kept in a jute bag and stored in a cool environment at atmospheric temperature with shields and sandy grounds. The samples were water sprayed morning and evening to avoid dehydration. The washed periwinkle were cleaned to remove dirt and other extraneous materials. It was then blanched in hot water (100^{o}C for 10mins), using a sterilized needle to extract the meat from the shell. Afterward, the fresh periwinkle meat was dried using the cabinet and oven drying method to achieve the moisture content to a safe storage level for the physical properties analysis. An existing cabinet dryer in the Department of Agricultural and Bioresources Engineering, Michael Okpara University of Agriculture Umudike, Abia State was used in performing this experiment. The cabinet dryer was made of galvanized sheet metals (length of 105 cm, width of 65 cm and depth of 85 cm). It consists of flat metal trays (length of 100 cm, width of 60 cm and depth of 10 cm), the drying cabinet, and a heat exchanger. The blower circulates heat in the chambers. It also has an exit vent. The cabinet dryers` primary heat source was a cooking gas to regulate its burning heat pressure. The maximum temperature of the dryer was 60ºC, and the drying rate was checked with a two-hour interval for each specie sample until the constant moisture content was achieved.

The oven drying of the extracted periwinkle meat sample was done using a conventional electric oven drier at a constant temperature of 105ºC for about three hours (Shreve *et al.*, 2006), at the Department of Agricultural and Bioresources Engineering, Umudike. Also, the drying rate was checked with a time interval of one hour for each specie sample until the constant moisture content was achieved. The flow chart for periwinkle meat samples processing is shown in Fig 1:

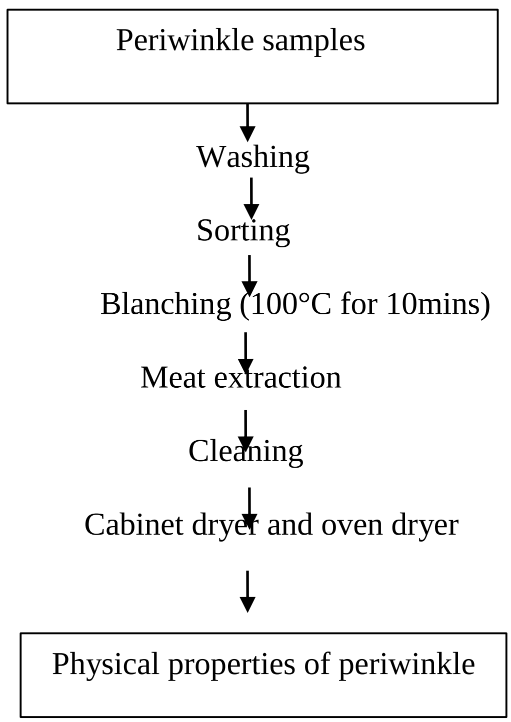

Figure 1: Flow chart for periwinkle meat processing

The drying of the two species of the periwinkle meat samples *P. aurita* and *T. fuscatus* was at about the temperature of 105ºC for 3 hours in an electric oven dryer, having an ambient temperature of 31ºC and ambient relative humidity of 57% while using the cabinet dryer, the temperature was at about 60ºC for 10hours. The ambient temperature and relative humidity were at 33.3ºC and 61%, respectively.

2.2 Evaluation parameters

Periwinkle meat samples of 3 replicates were selected from the bulk samples to determine the physical properties which are geometrical and gravimetric properties of the two varieties of periwinkle samples used. The following are the physical properties of the samples determined:

(i) The periwinkles meat length and width were measured using an electronic vernier caliper (Insize stainless:Ip67, India) with an accuracy of 0.01 mm. The geometric mean diameter was calculated using Equation 1:

$$Dg = LW^{\frac{1}{2}} \quad (1)$$

where: Dg = Geometric mean diameter (mm)
L = Length (mm)
W= Width (mm)

(ii) Determination of the sphericity of the periwinkle meat. The sphericity of the periwinkle meat is an index of its roundness. The sphericity (Sp) was calculated using Equation 2 for the two periwinkle varieties.

$$Sp = Dg/L \ x \ 100 \quad (2)$$

where: Sp = sphericity
Dg = Geometric mean diameter (mm)
L= Length (mm)

(iii) Determination of angle of repose of the periwinkle meat. Three structural surfaces, plywood, glass, and metal, were inclined while the plane was gently raised. The angle of inclination at which the sample starts sliding was recorded from a graduated protractor attached to the equipment for the angle of repose.

(iv) Determination of the moisture content of the periwinkle meat. The weight of the sample was taken by weighing balance (ASARWA-380016, India) and recorded. The sample was oven-dried at about 105^oC for 3 hours. The cabinet sample was dried at about 60^oC for 10 hours.

Then the dried sample was weighed, and the moisture content of the periwinkle meat was determined using Equation 3:

$$MC(wb)\% = (Ww - Wd)/Ww \ x \ 100 \quad (3)$$

where: MC (wb) = moisture content on wet basis (%)
Ww = weight of wet sample (g)
Wd = weight of dried sample (g)

(v) The weight of periwinkle meat was determined using an electronic weighing balance (ASARWA-380016, India).

(vi) Determination of the bulk density of periwinkle meat. A known cylinder volume was used, the weight of the periwinkle meat sample was taken and recorded, and the density was determined using Equation 4:

$$Db = \frac{W_s}{V_b} \quad (4)$$

where: Db = bulk density of the periwinkle meat sample (g/cm^3)
W_s = weight of the periwinkle meat sample (g)
V_b = volume occupied by periwinkle meat sample (cm^3).

(vii) Determination of the True/Solid Density of periwinkle meat was determined using water displacement. The sample was weighed with mass M_a and emptied into a graduated cylinder containing water. The average volume of the water displaced by the periwinkle meat was recorded as V_w using the weighing and modified water displacement method described by Okeke *et al.*, (2011) with three replications, and the average value was calculated. The true/solid was calculated using Equation 5:

$$Ds = \frac{M_a}{V_w} \quad (5)$$

where: Ds = Solid density of periwinkle meat sample (g/cm^3)
M_a = Mass of sample (g)
V_w = Volume of water displaced (cm^3)

(viii) Determination of the porosity of periwinkle meat. Porosity was determined from the average values of bulk density and solid density based on the relationship for porosity using Equation 6 (Asoegwu *et al*., 2006).

$$P = (1 - Db)/Ds \ x \ 100 \quad (6)$$

where:
P = porosity of periwinkle meat sample
Db = bulk density of periwinkle meat sample (g/cm^3)
Ds = Solid density of periwinkle meat sample (g/cm^3)

(ix) The ambient temperature of periwinkle meat was determined using a thermocouple (Altek 222A:Altek industries) readings in degree celsius (ºC).

(x) The relative ambient condition of periwinkle meat was determined using a multi-functional Barometer (Lutron MHB-382SD: Taiwan). This was used to measure the relative humidity, temperature and wind pressure every hour.

(xi) Determination of the Colour of periwinkle meat was determined using a colourimeter. The colour was determined for the fresh, oven-dried, and cabinet-dried samples. This device uses colour codes RGB (Red, Green, and Blue). The colour characteristics index of the periwinkle samples include the lightness (L*), measure of redness (a*) and chroma levels (b*). Assessment was carried out by measuring the visual coloured area on each sample with the scale of 8 (excellent colour quality), 7 (slight colour), 6 (<25% colour), 5 (25-50% colour) and 4 (>50% colour) (Garnayak *et al*., 2008).

2.3 Statistical Analysis

The data obtained from the experiments were analyzed using an ANOVA two-factor replication test at a significant difference of $P < 0.05$ to check the physical parameters' deviation for the two periwinkle varieties (*Pachymelania aurita* and *Tympanotosus fuscatus)*. The fresh, oven-dried, and cabinet-dried periwinkle meat samples are shown in Figure1 a, b and c.

(a)

(b)

(c)

Figure 1: (a) Fresh periwinkle meat samples (b) oven-dried periwinkle meat samples (c) cabinet-dried periwinkle meat samples

3. RESULTS AND DISCUSSION

The geometric properties of the periwinkle (meat) samples are presented in Table 1. It was observed that *Pachymelania aurita* possesses a higher average value in the length, width, geometric mean, and sphericity than the *Tympanotonos fuscatus*. The higher values in length and width results from its spiky nature. Also, the higher value in the sphericity showed consistency with published studies such as Ituen (2015) and Solomon *et al*., (2017). Periwinkle meat dimensions determine the clearances of periwinkle cracking rollers, the hopper design, and screen aperture sizing for periwinkle shell-meat separations, storage, and handling of the periwinkles.

In contrast, sphericity is a shape function that determines the rolling ability of agricultural materials during conveying (Taser *et al.*, 2005; Garnayak *et al*., 2008). The fresh samples' angle of repose (AOR) values are higher than the oven-dried and cabinet-dried samples due to the moisture content drastic reduction which cause weight reduction. Table 2 presents the ANOVA mean values for the geometrical properties of the *T. fuscatus* and *P. aurita* varieties of periwinkle meat showed a significant difference at P < 0.05.

Table 1. Geometric properties of fresh, oven, and cabinet dried samples (mc%) of

Physical properties	Unit		*P. aurita*			*T. fuscatus*	
		Fresh	Oven-dried	Cabinet dried	Fresh	Oven-dried	Cabinet dried
Length	(mm)	56.2±0.5	13.6±2.0	14.9±0.8	56.0±2.0	11.4±1.2	15.6±2.0
Width	(mm)	7.03±1.2	5.13±0.6	4.33±1.6	7.75±0.5	5.14±0.8	4.58±1.4
Geometric mean	(mm)	18.02±0.8	8.35±2.4	8.05±0.2	16.5±0.6	7.64±0.5	8.44±0.6
Sphericity	(%)	78.60±1.5	61.5±0.4	53.8±2.0	80.5±1.6	67.3±2.0	54.2±2.4

***Pachymelania aurita* and *Tympanotosus fuscatus* periwinkle meat samples**

AOR plywood	(°)	39.0±2.0	24.0±4.0	26±3.4	35.0±2.8	28.0±3.0	22.0±2.8
AOR glass	(°)	31.0±0.2	23.0±3.0	25.5±2.2	29.0±2.0	26.5±1.8	20.0±3..0
AOR metal	(°)	33.0±1.4	25.0±2.0	26.0±3.5	32.0±4.0	26±3.0	21.5±3.2

The variation in the length (L), width (W), geometric mean diameter (Dg), sphericity (Sp), and AOR (plywood, glass, and metal) of the fresh, oven and cabinet dried periwinkle samples are shown in Figure 2 and 3.

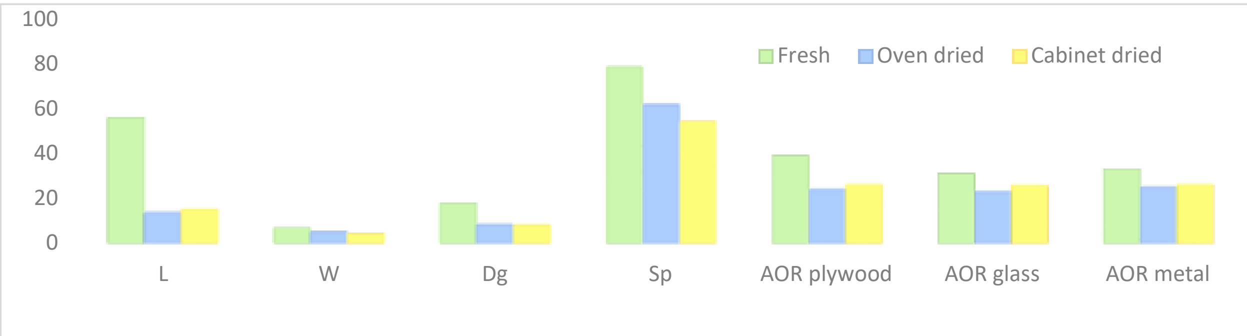

Figure 2: Variation in length (L), width (W), geometric mean diameter (Dg), sphericity (Sp), and AOR (plywood, glass, and metal) of the fresh oven and cabinet dried *pachymelania aurita* periwinkle meat samples.

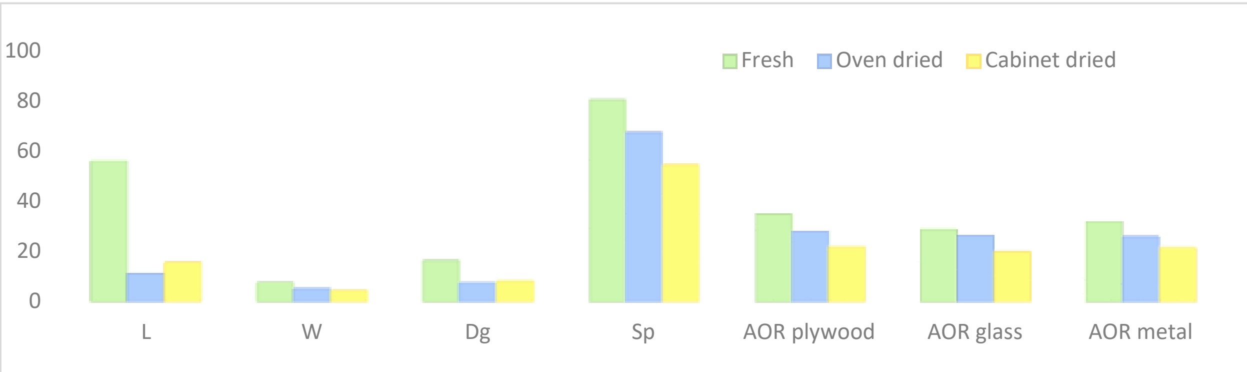

Figure 3: Variation in the length (L), width (W), geometric mean diameter (Dg), sphericity (Sp), and AOR (plywood, glass, and metal) of the fresh oven and cabinet dried *tympanotosus fuscatus* periwinkle meat samples.

Table 2 ANOVA table of geometric properties of the periwinkle meat samples

S/NO	Nutrient	Sample	Mean (cfu/g)	F	Sig.
1	Length (mm)	Fresh *P.aurita*	56.20	738.3917	1.69E-14
		Oven-dried *P.aurita*	13.56		
		Oven-dried *T.fuscatus*	11.35		
		Fresh *T.fuscatus*	56.0		
		Cabinet-dried *P.aurita*	14.96		
		Cabinet-dried *T.fuscatus*	15.57		
2	Width (mm)	Fresh *P.aurita*	1.03	8.747869	0.001076
		Oven-dried *P.aurita*	5.13		
		Oven-dried *T.fuscatus*	5.14		
		Fresh *T.fuscatus*	0.75		
		Cabinet-dried *P.aurita*	4.33		
		Cabinet-dried *T.fuscatus*	4.58		
3	Geometric mean (mm)	Fresh *P.aurita*	8.0	3.318182	0.041164
		Oven-dried *P.aurita*	8.35		
		Oven-dried *T.fuscatus*	7.64		
		Fresh *T.fuscatus*	6.0		
		Cabinet-dried *P.aurita*	8.05		
		Cabinet-dried *T.fuscatus*	8.44		
4	Sphericity (%)	Fresh *P.aurita*	14.0	1007.929	2.63E-15
		Oven-dried *P.aurita*	61.50		
		Oven-dried *T.fuscatus*	67.31		
		Fresh *T.fuscatus*	11.0		
		Cabinet-dried *P.aurita*	53.81		
		Cabinet-dried *T.fuscatus*	54.21		
5	AOR plywood (°)	Fresh *P.aurita*	39.0	65.90588	2.64E-08
		Oven-dried *P.aurita*	24.0		
		Oven-dried *T.fuscatus*	28.0		
		Fresh *T.fuscatus*	35.0		
		Cabinet-dried *P.aurita*	26.0		
		Cabinet-dried *T.fuscatus*	26.0		
6	AOR glass (°)	Fresh *P.aurita*	31.0	29.52	2.4E-06
		Oven-dried *P.aurita*	23.0		
		Oven-dried *T.fuscatus*	26.5		
		Fresh *T.fuscatus*	29.0		
		Cabinet-dried *P.aurita*	25.5		
		Cabinet-dried *T.fuscatus*	20.0		
7	AOR metal (°)	Fresh *P.aurita*	33.0	30.38889	1.89E-06
		Oven-dried *P.aurita*	25.0		
		Oven-dried *T.fuscatus*	26.0		
		Fresh *T.fuscatus*	32.0		
		Cabinet-dried *P.aurita*	26.0		
		Cabinet-dried *T.fuscatus*	21.5		

The gravimetric properties for the two varieties of periwinkle meat are presented in Table 3. The initial weight of *P. aurita* and *T. fuscatus* was 29 g and 32 g, which decreased continually with the drying time until a constant weight of the samples was obtained. A comparison analysis was carried out using ANOVA on the mean values for the gravimetric properties of the *T. fuscatus* and *P. aurita* varieties of periwinkle meat. Table 4 shows a significant difference at $p < 0.05$.

3.1 The angle of repose of dried periwinkle

The angle of repose using plywood, glass and metal materials for fresh *P. aurita* were 39º, 31º, 33º and fresh *T. fuscatus* were 35º, 29º, 32º respectively while the oven-dried *P. aurita* were 24º, 23º, 25º, and *T. fuscatus* were 26º, 25.5º, 26º. Moreso, cabinet dried *P. aurita* were 28º, 26.5º, 26º, and *T. fuscatus* were 22º, 20º, and 21.5º. The angle of repose obtained for the different periwinkle meat samples with other materials was within the limit for agricultural materials, which is 45º (Bob-Manuel, 2012). It was observed that *T. fuscatus* had a greater angle of repose with a plywood material, whereas *P. aurita* had a greater angle with the metal and glass materials. This property helps determine the minimum flow slope in the self-emptying bin and the minimum slope in a hopper.

Table 3. Gravimetric properties of periwinkle samples

Physical properties	**Unit**	***Pachymelania aurita***			***Tympanotosus fuscatus***		
		Fresh sample	Oven-dried	Cabinet dried	Fresh sample	Oven-dried	Cabinet Dried
Moisture content$_{(wb)}$	(%)	76.7±2.2	15.3±1.5	17.4±2.0	75.8±4.2	13.7±1.3	14.3±2.1
Weight	(mm)	29.0±0.8	6.0±0.3	7.0±0.4	32.0±2.5	6±0.2	6.0±0.2
Bulk density	(g/cm^3)	0.64±2.4	0.9±0.4	0.4±0.1	0.7±0.1	0.3±0.1	0.3±0.1
Solid density	(g/cm^3)	0.91±1.8	1.0±0.2	1.0±0.2	0.7±0.2	1.0±0.1	1.0±0.2
Porosity	(%)	32.8±3.0	71.4±2.6	64.1±3.5	47.3±2.6	68.4±3.4	70.0±3.1
Amb temp	(ºC)	23.1±2.6	31.1±2.0	33.3±2.6	22.4±2.2	31.1±2.0	32.5±2.3
Atmos. Relat Humidity	(ºC)	71.0±4.0	56.0±3.4	62.0±3.2	70.0±3.6	57.0±3.0	61.0±2.8
Temp	(ºC)	16.0±2.0	105.0±4.2	60.0±2.8	18.0±2.0	108±6.2	63.0±3.0

The variation in the moisture content (MC), weight (Wt), bulk density (Db), solid density (Ds), Porosity (P), ambient temperature (At), ambient relative humidity (ARH), temperature (T) of the fresh, oven and cabinet dried periwinkle meat samples are shown in Figure 4 and 5 respectively.

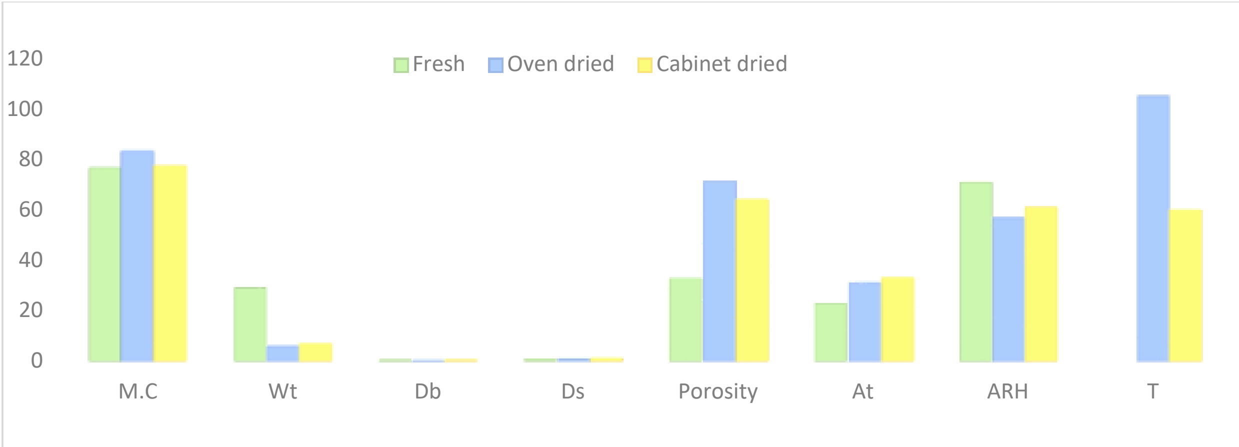

Figure 4: Variation in the moisture content (MC), weight (Wt), bulk density (Db), solid density (Ds), Porosity (P), ambient temperature (At), ambient relative humidity (ARH), temperature (T) of fresh, oven and cabinet dried *pachymelania aurita* periwinkle meat samples.

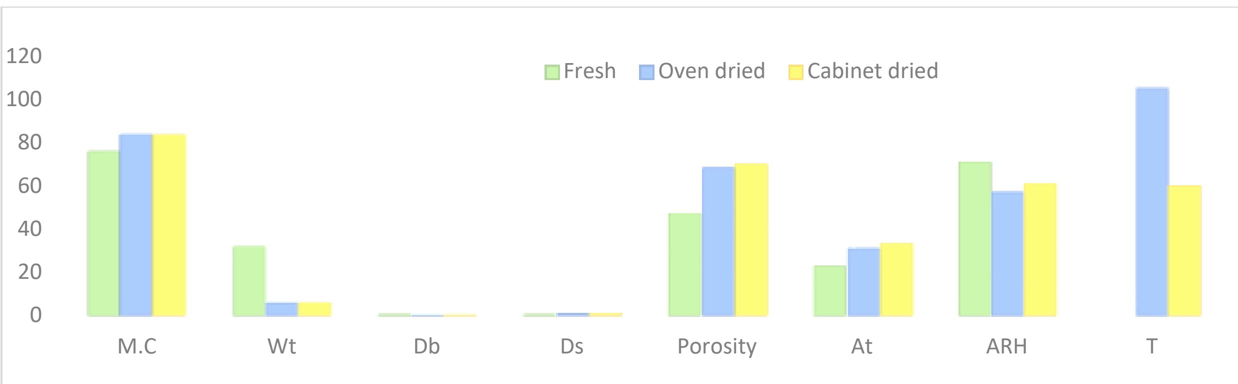

Figure 5: Variation in the moisture content (MC), weight (Wt), bulk density (Db), solid density (Ds), Porosity (P), ambient temperature (At), ambient relative humidity (ARH), temperature (T) of fresh, oven and cabinet dried *tympanotosus fuscatus* periwinkle meat samples.

3.2 Colour of dried periwinkle

The colours of dried periwinkle meat for the two species of the periwinkle samples are represented in Table 5. Visual observation of the dried periwinkle meat showed that the colour of the samples were still greenish but the colour variation (ΔE) recorded from the colourimeter showed that the difference in the colour values are negligible.

Table 4 ANOVA of gravimetric properties of the periwinkle samples

S/NO	Nutrient	Sample	Mean (cfu/g)	F	Sig.
1	Moisture content (%)	Fresh *P.aurita*	76.67	1388.189	3.87E-16
		Oven-dried *P.aurita*	15.25		
		Oven-dried *T.fuscatus*	13.73		
		Fresh *T.fuscatus*	75.76		
		Cabinet-dried *P.aurita*	17.42		
		Cabinet-dried *T.fuscatus*	14.33		
2	Weight (mm)	Fresh *P.aurita*	29.0	452.3636	3.15E-13
		Oven-dried *P.aurita*	6.0		
		Oven-dried *T.fuscatus*	6.0		
		Fresh *T.fuscatus*	32.0		
		Cabinet-dried *P.aurita*	7.0		
		Cabinet-dried *T.fuscatus*	6.0		
3	Bulk density (g/cm^3)	Fresh *P.aurita*	0.6380	3.105882	0.05
		Oven-dried *P.aurita*	0.2857		
		Oven-dried *T.fuscatus*	0.3158		
		Fresh *T.fuscatus*	0.6880		
		Cabinet-dried *P.aurita*	0.3590		
		Cabinet-dried *T.fuscatus*	0.3000		
4	Solid density	Fresh *P.aurita*	0.9091	0.016	0.999877
	(g/cm^3)	Oven-dried *P.aurita*	1.0		
		Oven-dried *T.fuscatus*	1.0		
		Fresh *T.fuscatus*	0.6600		
		Cabinet-dried *P.aurita*	1.0		
		Cabinet-dried	1.0		
5	Porosity (%)	*T.fuscatus*	32.82	300.3095	3.6E-12
		Fresh *P.aurita*	71.4		
		Oven-dried *P.aurita*	68.42		
		Oven-dried *T.fuscatus*	47.27		
		Fresh *T.fuscatus*	64.1		
	Amb temp (ºC)	Cabinet-dried *P.aurita*	70.0		
6		Cabinet-dried	23.1	74.9	1.26E-08
		T.fuscatus	31.1		
		Fresh *P.aurita*	31.1		
		Oven-dried *P.aurita*	23.1		
		Oven-dried *T.fuscatus*	33.3		
	ARH (ºC)	Fresh *T.fuscatus*	33.3		
7		Cabinet-dried *P.aurita*	71.1	137.2385	3.7E-10
		Cabinet-dried	57.0		
		T.fuscatus	57.0		
		Fresh *P.aurita*	71.1		
		Oven-dried *P.aurita*	61.1		
	Temp (ºC)	Oven-dried *T.fuscatus*	61.1		
8		Fresh *T.fuscatus*	0.00	5452.6	1.06E-19
		Cabinet-dried *P.aurita*	105.0		
		Cabinet-dried	105.0		
		T.fuscatus	0.0		

Fresh *P.aurita*	60.0
Oven-dried *P.aurita*	60.0
Oven-dried *T.fuscatus*	
Fresh *T.fuscatus*	
Cabinet-dried *P.aurita*	
Cabinet-dried *T.fuscatus*	

Table 5. RGB colour code for the two periwinkle samples.

	Oven-dried		**Cabinet dried**	
	P. aurita (spike)	*T. fuscatus (un-spike)*	*P. aurita (spike)*	*T. fuscatus (un-spike)*
Red	8	7	7	7
Green	7	7	7	7
Blue	6	5	7	6

4. CONCLUSION

The *P. aurita* samples had average higher values in length, width, geometric mean diameter, sphericity, angle of repose, moisture content and solid density while *T. fuscatus* had higher values in weight, bulk density, porosity, ambient temperature, relative humidity and temperature.

The determined physical properties from the study can be used as input parameters for designing efficient processing equipment for periwinkle meat. The ANOVA results showed a significant difference in the physical properties between the fresh sample, oven-dried, and cabinet-dried samples. Hence, the two drying methods (oven and cabinet) are recommended for appropriate drying and storing of the periwinkle meat samples.

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