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Quality Improvement of Fermented Young Muskmelon through Inoculation with Different Starter Cultures of Lactic Acid Bacteria

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ABSTRACT

Application of lactic acid bacteria will be contributed to improve the quality and safety of local fermented food products and optimize to indigenous agricultural commodities. The objective of this research is to improve the quality and safety of fermented muskmelon inoculated with different starter cultures of lactic acid bacteria. The processing of fermented muskmelon were prepared with To = Control; T1 = Lactobacillus plantarum; T2 = Lactobacillus brevis; T3 = Lactobacillus pentosus; and T4 = Pediococcus pentosaceus in this research experiment. The safety and quality of samples were determined. The titratable acidity, total soluble solid and salty content were increased during fermentation process. Physicochemical properties and antioxidant properties in fermented muskmelon inoculated with different starter cultures of lactic acid bacteria was significantly different ($p \leq 0.05$) excepted of sodium chloride. The total viable counts (TVC) was significantly different at $0.42x10^3$ CFU/g for sample of control and the lowest of samples inoculated with different starter cultures of lactic acid bacteria. The safety of fermented muskmelon against pathogenic bacteria such as salmonella, staphylococcus and coliform species were absent. The sensory evaluation of fermented muskmelon inoculated with different starter culture of lactic acid bacteria were significantly different ($p \leq 0.05$) accepted sourness and saltness. In conclusion, the physicochemical properties, microbiological load, and sensory properties were significantly different in sample products. However, the above-mentioned isolation could be utilized as starter cultures for the commercial fermentation of vegetables, fermentation of fish and yogurt of production should be determined.

Keyword
Lactic acid bacteria, Safety and quality, Fermentation process, Muskmelon, Starter culture.

Introduction
Lactic acid bacteria are GRAS (Generally Recognized as Safe) organisms, and probiotics consisting of lactic acid bacteria primarily use *L. acidophilus*, *L. casei*, *L. reuteri*, and so on. Many lactic acid bacteria produce antimicrobial substances such as organic acids, hydrogen peroxide, diacetyl, carbon dioxide, and bacteriocins [1]. There is high possibility that the antimicrobials selected from fermented food show novel function to be useful for humans as probiotics showing beneficial effects. The novel finding of active LAB in a tropical region with a temperature of over 30-34ºC throughout the year itself is an important contribution to microbiology in relation to food processing, and the utilization of such a LAB should be very powerful for food industry not only in Cambodia but also in other parts of the world especially where the temperatures tend to increase due to global warming. Consumers' interest for diverse food fermentation has increased in recent years because of the positive perception of their beneficial impact on health. It is evident that novel methods are need to be found as well as new food preservation agents from natural origins. Bio-preservation refers to extending the shelf life and improving the quality and safety of food using microorganisms or their metabolites [2]. In this aspect, lactic acid bacteria are very good candidates [3]. Further, there is no research about apply the probiotic properties of lactic acid bacteria for bio-control of pathogenic bacteria and improvement of quality and safety in fermented muskmelon in Cambodia yet. Application of lactic acid bacteria will contribute to improve the quality and safety of local fermented food products and optimize to indigenous agricultural commodities products. The objective of the research is to improve the quality and safety of fermented muskmelon inoculated with different starter cultures of lactic acid bacteria.

Material and Methods
Preparation of LAB Starter Culture
Isolated LAB strains from fermented food should be prepared as inoculum for starter preparation according to the following procedure: The LAB will be sub-cultured twice at 30ºC in MRS broth. The culture will be grown in MRS broth for 48h before inoculation, the culture will be centrifuged at 10,000 g and the pellet obtained will be washed twice with sterilized physiological saline (0.85% w/v NaCl) solution. The pellet will be re-suspended in 200 ml sterilized fresh saline solution for use or inoculum [4]. The *Lactobacillus plantarum*, *Lactobacillus brevis*, *Lactobacillus pentosus* and *Pediococcus pentosaceus* were taken from Food Bioprocessing Laboratory in Faculty of Agro-Industry, Royal University of Agriculture (RUA).

Fermentation Process
Young muskmelon will be washed thoroughly with water and drain to remove excessive water. The fruits will be arranged into sterile plastic or glass jars, completely covered with the brine containing 10% NaCl and inoculated with starter culture suspension (prepared as above) to obtain the final cell density of 10^8 CFU/g. Control samples (without inoculum) will be prepared in the same way. Fermentation in brine will be done for 21 days [5]. Figure 1 shows the flow diagram of processing brine fermented muskmelon. The total acidity, pH and LAB count will be checked on 0, 1, 3, 5, 7, 10, 15, and 21 days respectively.

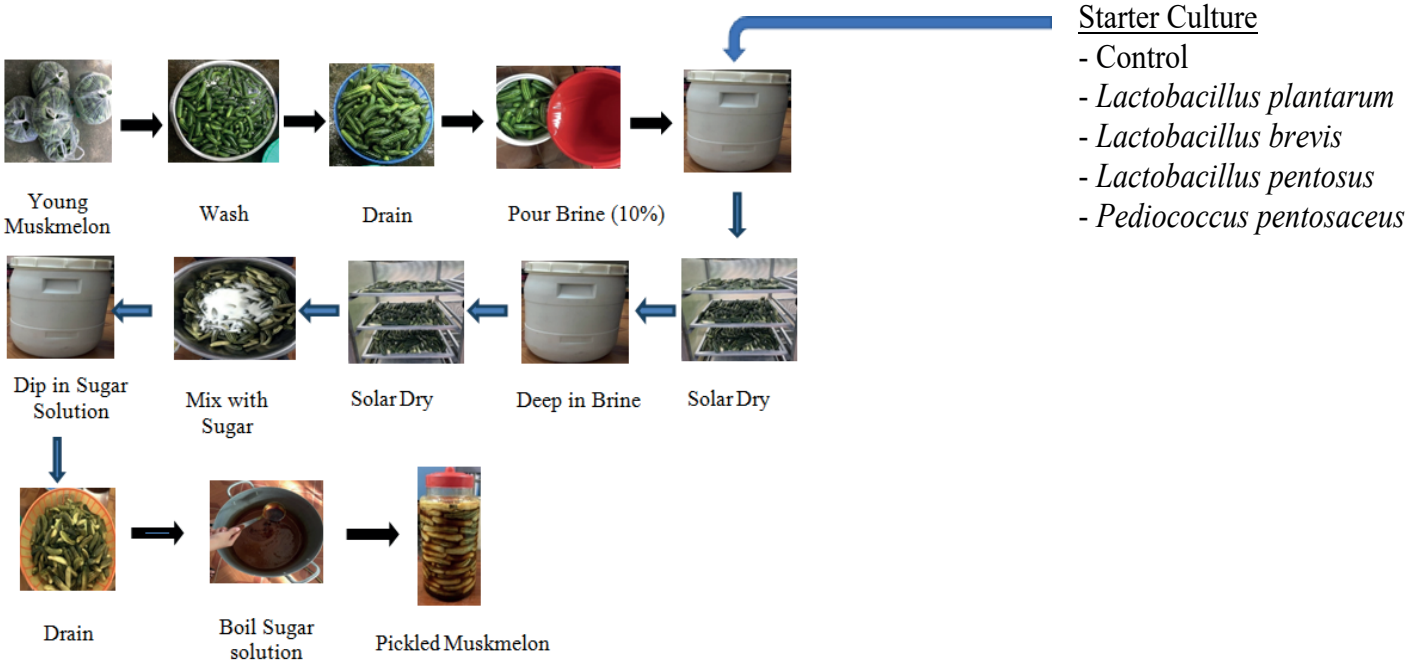

Figure 1. Flow diagram of traditional fermentation method of processing muskmelon

Physicochemical Properties Analysis

Determination of pH: The pH of samples was determined using a pH meter (pH meter C861, Consort, bio block, Belgium) according to the AOAC [6] method. The instrument was calibrated using two buffer solutions (pH 7.0 and 4.0) before pH of the samples was measured. The measurement was made by immersing the electrode in 10 ml of sample and the reading was repeated three times.

Determination of total soluble solids (TSS): The TSS of samples was determined as described by Soyer et al. [7] using a hand refractometer (Model Pal-BX/RI) equipped with a digital display.

Determination of titratable acidity: The titratable acidity (TA, expressed as % citric acid) was determined by placing samples in a beaker and titrating with standardized 0.1 N sodium hydroxide solution to pH 8.2 ± 0.1 [8].

Determination of moisture content: The moisture content of the samples was analyzed using MB series moisture analyzer (Model OHAUS M23).

Determination of water activity: The water activity (Aw) of the samples was determined using Smart water activity meter (Model Pawkit Aqualab).

Antioxidant analysis

Vitamin C analysis

Vitamin C of the samples was determined by iodine titration [8,9]. To 25 mL of sample in a 150 mL beaker was added 35 mL starch-sulfuric acid solution. The resulting solution was titrated with standardized 0.1 M iodine solution (covered from light), while stirring until the first stable blue color appeared. For the blank, samples were replaced with distilled water. Ascorbic acid (mg/100 mL) was calculated from the formula:

$$\text{Ascorbic acid}(\text{mg}/100\text{mL}) = \frac{\text{Net mL titrant}}{\text{mL sample}} \times 880.6$$

Determination of total phenolic content

The total phenolic content of samples was determined by Folin-Ciocalteu method following the procedure of Teresa Escribano-Bailón et al. [10]. The sample was diluted with 97% of ethanol and then 0.5 mL of the samples, 2.5 mL of Folin-Ciocalteu's phenol reagent (Sigma-Aldrich) and 2.5ml of 7.5% Na_2CO_3 were added. After standing for 20 mins, the absorbance readings were measured at 760 nm (Shimadzu UV-1601 spectrophotometer) with water plus reagent as blank samples [11]. Total phenolic content was computed in a standard curve with gallic acid as reference phenol. The results were expressed as gallic acid equivalents (mgGAE/100ml).

Microbiological Analyses

Microbial analysis of the processed samples was conducted simultaneously with physicochemical analysis. Ten (10) g of the samples was aseptically transferred to 90mL sterile 0.1% peptone water, as diluent. Decimal dilutions in diluents solution were prepared and standard pour plating technique was carried out in appropriate agar media [12]. After the required incubation time and temperature, enumeration of different kinds of microorganisms was performed. The Total Viable Count (TVC) was enumerated following the method by Maturin and Peeler [13], Marotz et al. [14], and Mortor [15]; and yeast and mold counts using the method of Touma et al. [16]; and Beuchat and Cousin [17]. The coliforms were enumerated as described by Feng et al. [18]; and Kornacki and Johnson [19]. Pathogenic bacteria such as Staphylococcus, Salmonella spp., were determined following the methods described by Andrews et al. [20].

Sensory analysis

Sensory evaluations of the fermented samples will be carried out at the end of the process by a panel of 30 people. The fermented vegetables will be tasted at random and separately. Score of 1 to 9 (number 1 refers to not acceptable and number 9 to excellent taste and crunchiness) will be used in the evaluation and the mean values will be calculated [21,22].

Statistical analysis

The data generated in the study were statistically processed in duplicate with the SPSS 11.19 statistical software. The significance of the parameters was assessed by the Duncan's test at 5% threshold. The analysis of variance (ANOVA) allowed to process data from the evaluation of physicochemical, antioxidant and sensory properties of the fermented muskmelon inoculated with different starter culture of lactic acid bacteria. Although significant differences (α <0.05) were obtained, the ANOVA test is supplemented by Turkey's post ANOVA test to identify the variable(s) with very significant differences from the control values.

Results and Discussion

Physicochemical Properties and Lactic Acid Bacteria Load in Fermented Muskmelon

Physicochemical properties and lactic acid bacteria load of fermented young muskmelon inoculated with different starter cultures of lactic acid bacteria in fermentation period show in Table 1. The pH was decreased from 5.6-5.8 at zero day and 4.0-4.8 at the 21 day of fermentation process of fermented muskmelon inoculated with different starter culture of lactic acid bacteria. The treatable acidity, total soluble solid and salty content increased during fermentation process respectively. According Wang et al. [23] showed that the decrease of natural pH below 4.0 that occurs during the process does not have a negative effect on the efficiency of biochemistry, due to the dominance of lactic acid bacteria, capable of adapting to the low pH of the environment. According to Castellano et al. [24] released that lactic acid bacteria play a very important role due to the fact that, during the growth and fermentation process, they produce a range of metabolites with antimicrobial action, which include hydrogen peroxide, lactic acid, acetic acid and low molecular weight substances, antifungal compounds.

Lactobacillus plantarum was chiefly responsible for the brine acidity of the fermented cucumber [25]. Some species of lactic acid bacteria particularly *lactobacillus plantarum* were able in acidification of the substrates in significant in preservation of food

Table 1: Physicochemical Properties and Lactic Acid Bacteria During Fermentation of Fermented Young Muskmelon Inoculated with Different Starter Cultures of Lactic Acid Bacteria.

Day	Starter Culture of LAB	pH	TA (%)	TTS (°Brix)	NaCl (%)	LAB cfu/ml
00	Control	5.8	0.05	8.4	10.0	0^{b}
	Lactobacillus plantarum	5.8	0.09	8.2	10.5	$0.28x10^{3}$
	Lactobacillus brevis	5.6	0.07	7.8	10.8	$0.63x10^{3}$
	Lactobacillus pentosus	5.8	0.05	8.1	13.0	$0.29x10^{3}$
	Pediococcus pentosaceus	5.8	0.06	8.3	11.8	$0.26x10^{5}$
01	Control	5.3	0.12	7.4	8.5	$0.33x10^{3}$
	Lactobacillus plantarum	5.0	0.17	7.0	9.1	$0.29x10^{3}$
	Lactobacillus brevis	5.3	0.36	6.8	9.0	$0.27x10^{3}$
	Lactobacillus pentosus	5.2	0.19	7.0	10.9	$0.33x10^{3}$
	Pediococcus pentosaceus	5.0	0.19	7.1	9.3	$0.34x10^{5}$
03	Control	4.1	0.24	10.4	12.1	$0.29x10^{5}$
	Lactobacillus plantarum	3.5	0.31	9.9	11.6	$0.27x10^{5}$
	Lactobacillus brevis	4.1	0.19	9.9	11.3	$0.27x10^{5}$
	Lactobacillus pentosus	4.0	0.27	10.5	12.3	$0.3x10^{5}$
	Pediococcus pentosaceus	3.8	0.22	9.9	13.0	$0.74x10^{5}$
05	Control	4.8	0.29	39.0	13.5	$0.41x10^{5}$
	Lactobacillus plantarum	4.1	0.31	36.5	12.6	$1.12x10^{5}$
	Lactobacillus brevis	4.9	0.25	36.3	13.1	$1.1x10^{5}$
	Lactobacillus pentosus	4.7	0.24	38.2	14.0	$1.7x10^{5}$
	Pediococcus pentosaceus	4.4	0.33	33.1	14.4	$0.31x10^{5}$
07	Control	4.9	0.41	57.3	15.0	$0.25x10^{5}$
	Lactobacillus plantarum	4.1	0.44	51.9	14.3	$0.26x10^{5}$
	Lactobacillus brevis	4.9	0.38	65.0	14.3	$0.81x10^{5}$
	Lactobacillus pentosus	4.8	0.40	45.0	15.1	$0.59x10^{5}$
	Pediococcus pentosaceus	4.5	0.43	44.8	16.1	$0.5x10^{5}$
10	Control	4.8	0.34	62.5	14.9	$0.36x10^{3}$
	Lactobacillus plantarum	4.1	0.66	56.3	15.3	$0.41x10^{3}$
	Lactobacillus brevis	4.8	0.43	58.7	15.3	$0.1x10^{4}$
	Lactobacillus pentosus	4.7	0.44	48.5	14.9	$0.39x10^{5}$
	Pediococcus pentosaceus	4.4	0.56	51.6	15.0	$0.27x10^{5}$
15	Control	3.7	0.63	63.0	16.2	0
	Lactobacillus plantarum	4.3	0.66	56.8	16.8	0
	Lactobacillus brevis	3.4	0.63	61.1	17.6	$0.29x10^{3}$
	Lactobacillus pentosus	4.6	0.53	52.5	19.0	$0.28x10^{3}$
	Pediococcus pentosaceus	3.9	0.63	53.5	20.8	$0.51x10^{3}$
21	Control	4.8	0.48	63.6	18.0	0
	Lactobacillus plantarum	4.0	0.89	59.1	16.9	0
	Lactobacillus brevis	4.8	0.58	63.3	17.6	0
	Lactobacillus pentosus	4.7	0.53	55.7	17.4	0
	Pediococcus pentosaceus	4.5	0.60	54.0	16.4	0

Note: TSS: Total soluble solids; TA: Titratable acidity (expressed as lactic acid); LAB: Lactic Acid Bacteria.

[26]. *Lactobacillus plantarum* and *leuconostoc mesenteroides* are typical for spontaneous fermentation of vegetables [27]. The fermentation processed will be defined by different physiochemical parameters (salinity, acidity temperature, presence of antimicrobial compounds, etc.) which will be decisive for obtaining a fermented product of high quality, which is safe and microbiologically stable. Fermentation can occur spontaneously; however, several authors recommend the use of starter cultures in order to manage the process [28,29]. Lactic acid bacteria have important role in food, fermented feed and preservation as the natural microbiology or added as starter culture under controlled condition. The preservation of effect exerted by lactic acid bacteria is mainly due to the production of organic lactic acid which lowered pH [30,31].

Physicochemical Properties in Fermented Young Muskmelon

Physicochemical properties in fermented young muskmelon through inoculation with different starter cultures of lactic acid bacteria show in Table 2. Physicochemical properties and antioxidant properties in fermented muskmelon inoculated with different starter cultures of lactic acid bacteria were significantly different ($p \leq 0.05$) accepted sodium chloride. The lowest of pH was sample inoculated with *Lactobacillus plantarum* (4.03) and followed by sample inoculated with *Pediococcus pentosaceus* (4.47). According to some authors, the spoilage of fungal microflora causes the reduction of pH in the control samples [32]. The highest of titratable acidity were samples inoculated with *Lactobacillus plantarum* (0.89%). According to Leal-Sanchez et al. [33] reported that the selection of appropriate initial lactic acid bacteria inoculate is important to increase the titratable acidity. The total soluble solid content was a significant difference in fermented muskmelon. The content of salt ranged from 16.35 to 17.96% in fermented muskmelon inoculated with different starter culture of lactic acid bacteria. Moisture content was highest in samples inoculated with *Lactobacillus pentosus* and lowest was inoculated with *Pediocuccus pentosaceus*. Water activities was significant difference in fermented muskmelon. The number of vitamin C and total phenolic content were increased in fermented muskmelon inoculated with different starter culture of lactic acid bacteria. According to Admassie [34] reported the number of vitamins in the product is also increased due to the fermentation process and the activity of specified microorganisms. Total phenolic content was significantly different in samples inoculated with starter culture of lactic acid bacteria than control sample was the lowest. A result showed that total phenolic content increased after the fermented muskmelon inoculated with different starter culture of lactic acid bacteria. Thus, Lactic acid fermentation can increase the total phenolic content in samples due to the lactic acid bacteria activity. According to Nazarni et al. [35] recorded that fermentation process causes the microbial enzyme producing the higher chemical compounds from the plant as flavonoids, tannin, alkaloids, and phenylpropanoid. The lactic acid bacteria contain in the fermentation contributes to the simple phenolic conversion and phenolic compounds depolymerization with the high molecular weight [36]. The B-glucosidase from the microbes can hydrolyze phenolic and flavonoid during the fermentation. *Lactobacillus plantarum* was reported to have a strong glucosidase activity [37]. Zhang et al. [38] added that fermentation can induce the cell wall structural breakdown causing the bioactive compounds release and/or synthesis. Ng et al. [39] released that total phenolic content increased after fermentation of plants parts.

Microbial Load in Fermented Young Muskmelon

Enumeration of microbial hazard contamination in fermented muskmelon through inoculation with different starter cultures of lactic acid bacteria is shown in Table 3. The total viable counts (TVC) was significantly different $0.42x10^3$ CFU/g in sample of control and lowest of samples inoculated with different starter cultures of lactic acid bacteria. The high count of TVC in the samples only signified the microbiological quality of the samples and that safety of food should not only be based on this count but rather on the microorganisms that predominates and whether or not these are pathogenic or useful bacteria. The quality of samples can be rated as "acceptable" according to the International Commission for Microbiological Specification for Foods [40], in which the plate counts of $\leq 10^3$ are "acceptable, $\geq 10^4$ to $\leq 10^5$ as tolerable, and $\geq 10^6$ as unacceptable. The yeast counts were significantly different in fermented muskmelon with highest samples of control ($0.36x10^3$cfu/g), *Lactobacillus plantarum* ($0.34x10^3$cfu/g) and lowest in samples of *Lactobacillus brevis* ($0.29x10^3$cfu/g) and *Lactobacillus pentosus* ($0.28x10^3$cfu/g) by inoculated with different starter cultures of lactic acid bacteria. On the other hand, facultative anaerobe, osmophilia yeasts were able to grow on the samples. The presence of yeast suggests that prolonged storage can cause bloated muskmelon and bulging of container due to the presence of carbon dioxide as product of metabolism. Identification of yeast species can ensure the safety of the products. The absence of lactic acid bacteria is expected after the samples have been subjected to heat during processing. The safety of fermented muskmelon against pathogenic

Table 2: Physicochemical Properties in Fermented Muskmelon Inoculated With Different Starter Cultures of Lactic Acid Bacteria.

Stater Culture of LAB	Physicochemical Properties						Antioxidant properties	
	pH	TA (%)	TTS (°Brix)	$NaCl^{ns}$ (%)	MC (%)	AW	Vit. C (mg/100g)	TPC (mgGAE/ml)
Control	4.77^a	0.48^b	63.63^a	17.96	35.48^d	0.68^a	18.54^e	0.19^c
Lactobacillus plantarum	4.03^c	0.89^a	59.13^b	16.91	36.15^c	0.67^b	23.33^c	0.23^a
Lactobacillus brevis	4.80^a	0.58^b	63.33^a	17.64	37.90^b	0.68^a	22.27^d	0.22^a
Lactobacillus pentosus	4.73^a	0.53^b	55.70^c	17.43	40.53^a	0.68^a	29.13^b	0.21^b
Pediococcus pentosaceus	4.47^b	0.60^b	53.97^d	16.35	34.92^e	0.67^b	39.66^a	0.23^a

Values in the same column having different superscript are significantly different at 5% level of probability ($p \leq 0.05$)

Note: TSS: Total soluble solids; TA: Titratable acidity (expressed as lactic acid); A_w: Water activity; TPC: Total phenolic content; MC: Moisture content.

Table 3: Microbial Load of Fermented Young Muskmelon through Inoculation with Different Starter Cultures of Lactic Acid Bacteria.

Starter Culture of LAB	TVC cfu/g	Yeast cfu/g	LAB* cfu/g	Coliform cfu/g	Salmonella cfu/25g	Staphylococcus cfu/g
Control	$0.42x10^{3a}$	$0.36x10^{3a}$	0	0	0	0
Lactobacillus plantarum	$0.32x10^{3b}$	$0.34x10^{3a}$	0	0	0	0
Lactobacillus brevis	$0.38x10^{3ab}$	$0.29x10^{3b}$	0	0	0	0
Lactobacillus pentosus	$0.32x10^{3b}$	$0.28x10^{3b}$	0	0	0	0
Pediococcus pentosaceus	$0.32x10^{3b}$	$0.33x10^{3ab}$	0	0	0	0

Values in the same column having different superscript are significantly different at 5% level of probability ($p \leq 0.05$)

Note: TVC: Total Viable Count; LAB: Lactic Acid Bacteria.

*LAB was count after 21 days of fermentation.

Table 4: The Sensory Evaluation of Fermented Muskmelon Inoculated With Different Starter Culture of Lactic Acid Bacteria.

Parameters	Treatments				
	T0	T1	T2	T3	T4
Color	$5.56^{a,b}$	5.20^{b}	$5.90^{a,b}$	6.3^{a}	$5.66^{a,b}$
Smell	5.43^{b}	5.46^{b}	$6.00^{a,b}$	6.46^{a}	$5.63^{a,b}$
Sourness^{ns}	5.43	5.06	5.43	6.03	5.80
Sweetness	$5.43^{a,b}$	5.16^{b}	$5.86^{a,b}$	6.23^{a}	$6.03^{a,b}$
Saltness^{ns}	5.80	5.30	5.83	5.76	5.73
Crispy	5.93^{b}	6.06^{b}	6.43^{b}	7.53^{a}	6.10^{b}
Flavor	5.73^{b}	5.63^{b}	$6.10^{a,b}$	6.70^{a}	$6.03^{a,b}$
Texture	$5.93^{a,b}$	5.79^{b}	5.80^{b}	6.56^{a}	$6.10^{a,b}$
Acceptability	5.66^{c}	$6.16^{b,c}$	6.60^{b}	7.36^{a}	$6.36^{b,c}$

Values in the same row having different superscript are significantly different at 5% level of probability ($p \leq 0.05$)

Note: To = Control; T1 = *Lactobacillus plantarum*; T2 = *Lactobacillus brevis*; T3 = *Lactobacillus pentosus*; and T4 = *Pediococcus pentosaceus*

bacteria such as salmonella, staphylococcus and coliform species was achieved, as the presence of those pathogens was absent.

According to ICMSF [41], the ready to eat foods should be free of Salmonella as consumption of food containing this pathogen may result in food borne illness. In addition, the presence of this organism indicates poor food preparation and handling practices, such as inadequate cooking or cross contamination. Consideration may also be given to investigating the health status of food handlers on the premises who may have been suffering from salmonellosis or asymptomatic carriers of the organism [41]. The most common way of contamination of food is by contact with food handlers' hands, especially in the cases where the food is handled subsequent to cooking. Prolonged storage without refrigeration allows the bacteria to grow and form toxins. Since the toxins are heat stable, the incriminated food may also cause food poisoning even if it is further heat-treated [42]. According to Arroyo-Lopez et al. [43] and Ruiz-Barba et al., [44] reported that yeasts could be especially effective in diverse fermented vegetables where LAB are partially inhibited by the presence of high concentrations of antimicrobial compounds. Lactobacillus plantarum is significant for food preservation in acidification of the products [26]. Lactic acid bacteria used in fermented products help to provide and preserve sensorial and nutritional properties of food products. These bacteria in fact not only ferment lactose and citrate mainly to lactic acid but also synthesize short chain fatty acid. In addition to the presence of yeast, populations can also coexist during fermentation of vegetables. It predominates in certain types of elaborations such as directly brined where the Candida, Pichia, Debaryomyces, and Saccharomyces genera are the most representative [45,46]. Lactic acid fermentation is one of the most practical and widely applied methods for preserving and enhancing organoleptic and nutritional quality of food [47]. Lactic acid bacteria are responsible for taste, microbiological stability and safety of food at the main product of the process [48].

Sensory Evaluation of Fermented Muskmelon Inoculated with Different Starter Culture of Lactic Acid Bacteria

The sensory evaluation of fermented muskmelon inoculated with different starter culture of lactic acid bacteria is showed in Table 4. 30-trained persons performed a sensory test of products samples at the fermentation. The sensory evaluation of fermented muskmelon was significantly different ($p \leq 0.05$) excepted sourness and saltness in fermented muskmelon inoculated with different starter culture of lactic acid bacteria. Lactic acid bacteria contribute to the smell and taste of fermented food products. They acidity the food and cause lactic acid flavor [49]. According to Pederson [50] showed that concentration of salt had more effects on tissue hardness and showed that too tittle or too much salt can lead to softer and lower quality products.

The inoculated samples had suitable taste and texture, which were fermented solution at three of pH level. Viander et al. [51] reported that rapid increase in acidity minimized the influence of spoilage bacteria and reduced the influence of spoilage bacteria and probably enhanced the food microbiological and sensory quality of the food fermentation product and unique products can probably contained by application of starter cultures.

Conclusion and recommendation

The total viable counts (TVC) were significantly different inoculated with different starter cultures of lactic acid bacteria with $0.42x10^3$ cfu/g in sample of control and lowest of samples inoculated with different starter cultures of lactic acid bacteria. The yeast counts were significantly different in fermented muskmelon with highest samples of control ($0.36x10^3$cfu/g), *Lactobacillus plantarum* ($0.34x10^3$cfu/g) and lowest in samples of *Lactobacillus brevis* ($0.29x10^3$cfu/g) and *Lactobacillus pentosus* ($0.28x10^3$cfu/g) respectively. Physicochemical properties and antioxidant properties was significantly different excepted of sodium chloride. To sum up, the physicochemical properties, microbiological load, and sensory properties were significantly different due to the inoculation of different starter cultures of lactic acid bacteria. Therefore, the above-mentioned isolation could be utilized as starter cultures for the commercial fermented of vegetables, fermented of fish and production of yogurt.

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