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EFFECT OF DIFFERENT HOLDING TIMES OF PASTEURISATION ON *PSEUDOMONAS* SP. COUNT IN GOAT MILK

AMINAH ADNAN

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BY

AMINAH BINTI ADNAN

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TABLE OF CONTENT

CONTENT		PAGE
Certification		i
Acknowledgment		ii
List of Tables		iv
List of Appendixes		iv
Abstract		v
Abstrak		vi
1.0	Introduction	
	1.1 Background Study	1
	1.2 Problem Statement	2
	1.3 Objectives of study	2
2.0	Literature Review	
	2.1 Heat Treatment on Goat Milk and Bacteria Concerned	3
	2.1.1 Heat Stability of Goat Milk Composition Under Heat Treatment	4 4
	2.2 Composition of Goat Milk	5
	2.3 Goat Milk Lipolytic System	7
	2.4 Microbial Lipolytic Mechanism Releasing Volatile Compounds	9
	2.5 Non-Lactose Fermenting Bacteria Group	
3.0	Methodology	
	3.1 Collection of Samples	9
	3.2 General Platting and Laboratory Pasteurisation Procedures	9
	3.2.1 Preparation and Dilution of Milk Samples	10
	3.2.2 Preparation and Plating of Agar	11
	3.2.3 Laboratory Pasteurisation	11
	3.3 Bacterial Colony Count and Identification Assay	11-12
	3.4 Statistical Analysis	12
4.0	Results and Discussion	13-16
5.0	Conclusion	17
References		18-20
Appendixes		21-28

LIST OF TABLES

Table 1	Concentration of volatile BCFA and other VFA released from goat milk and cow milk by the action of microbial lipase	8
Table 2	Means (Log, CFU mL-^{1}l) and range of non-lactose fermenting bacteria count in pasteurised goat milk sample	14

LIST OF APPENDIXES

Appendix 1	Preparation of Peptone solution for Standard Plate Count and Coliform Plate Count	21
Appendix 2	Preparation of serial dilution for Standard Plate Count and Coliform Plate Count	22
Appendix 3	Preparation of MacConkey Agar	23
Appendix 4	Plating of Standard Plate Agar	24
Appendix 5	Computing and reporting plates result and selection of plates and counting of colonies	25

ABSTRACT

The distinctive goaty odour in goat milk is associated with lipolysis that occurs in the milk following milking. Lipolysis in milk is caused by several factors including the production of lipase from microbes in the milk. During pasteurisation, the number of bacteria is reduced but the enzyme may still remain. Pseudomonads can survive both laboratory and commercial pasteurization. *Pseudomonas* sp. that survives the treatment will proliferate further, especially after cooling and in storage condition. By increasing the holding time or holding period during pasteurisation, the presence of the bacteria can be reduced. The objectives of this study is to evaluate the bacteria colony count in goat's milk after pasteurisation treatment at different holding times that affect the milk odour. Six samples were acquired from a local dairy goat farm. Approximately 1000 ml were collected from pooled fresh milk for each sampling. Colony count for all treatments presented a reduction in colony number as the holding time was hold longer. However, the result tested statistically non-significant at $P>0.05$. There are no significant effect ($P>0.05$) of increasing holding time on non-lactose fermenting bacteria colony in goat milk. The mean CFU is 1.729 ± 0.101 CFU/ml, 1.712 ± 0.039 CFU/ml, 1.529 ± 0.051 CFU/ml and 1.464 ± 0.095 CFU/ml for 0 minutes, 15 minutes, 30 minutes and 45 minutes respectively. The isolates were confirmed as pseudomonads because of their ability to hydrolyse the 3% hydrogen peroxides as evidenced from their positive bubbling reaction. In conclusion, the effect of longer holding times on bacterial load in fresh goat milk is not very significant as it is also influenced by other factors.

ABSTRAK

Aroma susu kambing adalah berkaitan dengan lipolisis yang berlaku dalam susu sejurus proses pemerahan susu. Lipolisis dalam susu adalah disebabkan oleh beberapa faktor. Salah satu faktor adalah pengeluaran *lipase* dari mikrob dalam susu. Semasa proses pasteurisasi, bilangan bakteria dikurangkan tetapi enzim yang dihasilkan oleh bakteria masih kekal. *Pseudomonas* sp. yang bertahan selepas rawatan akan bertambah, terutama selepas penyejukan dan dalam keadaan penyimpanan. Dengan meningkatkan masa pegangan semasa pempasteuran, kehadiran bakteria boleh dikurangkan. Objektif kajian ini adalah untuk menilai koloni bakteria dalam susu kambing selepas rawatan pempasteuran pada masa pegangan yang berbeza yang mempengaruhi bau susu. Enam sampel diperoleh dari ladang kambing tenusu dimana 1000 ml sampel susu segar dikumpulkan pada setiap pensampelan. Pengiraan koloni untuk semua rawatan menunjukkan pengurangan bilangan koloni apabila masa pegangan dipanjangkan. Walau bagaimanapun, tiada efek yang signifikan bagi peningkatan masa pegangan ke atas koloni bakteria bukan fermenter laktosa pada $P>0.05$. Purata CFU direkodkan adalah 1.729 ±0.101 CFU/ml, 1.712 ±0.039 CFU/ml, 1.529 ±0.051 CFU/ml dan 1.464 ±0.095 CFU/ml bagi 0 minit, 15 minit, 30 minit dan 45 minit. Koloni disahkan sebagai pseudomonads dari kemampuan mereka untuk menghidrolasi 3% peroksida hidrogen seperti yang dibuktikan daripada tindak balas positif yang diperhatikan. Kesimpulannya, kesan pemegangan masa yang lama pada beban bakteria dalam susu kambing segar tidak signifikan kerana ia juga dipengaruhi oleh faktor-faktor lain.

1.0 INTRODUCTION

1.1 Background of Study

Pasteurisation is a heat processes that are designed to kill bacteria in milk that may be harmful and may cause spoilage of milk. Some bacteria can survive pasteurisation (Stewart, 1975), most often in very low numbers, though they are not considered harmful and will generally not spoil milk under normal refrigerated holding conditions and times. Most commonly found surviving bacteria are *Micrococcus, Enterococcus, Streptococcus, Lactobacillus, Bacillus* (spore-formers) and *Pseudomonas* (Macaulay, 1963; Eneroth, 2000: McPhee & Griffith, 2011). Other types of surviving biological entities after pasteurisation includes heat stable enzymes and spores of gram positives bacteria (Samaržija et al., 2012). One of most prominent characteristics of goat milk is the 'goaty' odour. The distinctive odour is associated with lipolysis that occurs in the milk following milking (Bjorke & Castberg, 1976; Park, 2008). Off-flavours can be a result from various factors such as transmission from feed given to the animal, bacterial or other microbial producing enzymes that causes the release of certain volatile compounds, or chemical processes such as oxidation that may occur in both raw and pasteurized milk (Bandler, 1984). The rate of lipolysis after pasteurisation that causes the release of volatile compound from fatty acids is affected by the number of lipase-producing pseudomonads. By increasing holding time during pasteurisation, it will reduce the number of total plate count of bacteria and reduce the presence of *Pseudomonas* sp. in the goat milk.

1.2 Problem Statement

Study of (Macaulay, 1963) had reported that pseudomonads strains had survived both laboratory and commercial pasteurisation, and that their presence in milk is the result of post-pasteurisation contamination is contrary to the reports of (Witter, 1961). In fact, pseudomonads being psychrotrophic bacteria are able to survive and increase significantly under refrigerated storage in which the cold and extended storage of raw milk favours its growth. Based on this fact, a more efficient pasteurisation holding time are to be determined that can reduce the presence of bacteria in pasteurized milk, specifically *Pseudomonas* sp. strains that are predominantly associated with milk lipolysis (Stewart, 1975) that resulted in off-flavouring of goat milk.

1.3 Objectives of Study

The objectives of this study was to evaluate the bacteria colony count in goat's milk after pasteurisation treatment at different holding times that affect the goaty odour. Specifically, the objectives were to determine bacteria colony number in pasteurised goat milk that has been pasteurized at holding times of 0 minutes, 15 minutes, 30 minutes, and 45 minutes using standard batch pasteurisation temperature of 62.8°C, to investigate *Pseudomonas* sp. bacteria count in pasteurized goat milk. Secondly, was to compare at what holding temperature the *Pseudomonas* sp. count is reduced.

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