Dedication

I dedicate this study

To my father soul
To my mother
To my brother and sisters
To my husband
And to all whom I love…….
Acknowledgement

Praise is due to Allah who gave me the strength and patience to conduct and complete this study. I wish to express my deepest appreciation to my supervisor Dr Omer Ibrahim Ahmed Hamid who has given throughout the progress of this work with patience and enthusiasm.

And also extended thanks to my colleagues and staff members of Dairy laboratory, College of Science and Technology of Animal Production of Sudan University of Science and Technology.

My sincere love to my parents, brother, sisters and my husband for their continuous encouragement, help and advice

Nafisa Awad Musa
# List of contents

Dedication.................................................................................................................. i.

Acknowledgment ....................................................................................................... ii.
List of contents ........................................................................................................... iii.
List of tables ................................................................................................................ iv.
English abstract.......................................................................................................... v.
Arabic abstract ........................................................................................................... vi.

1. Chapter One: Introduction......................................................................................... 1
   1.1. Back ground information .................................................................................... 1
   1.2. Problem statement ............................................................................................. 2
   1.3. Objective of study .............................................................................................. 3

2. Chapter Two: literature review.................................................................................. 4
   2.1. Definition of cheese .......................................................................................... 4
   2.2. The white soft cheese ....................................................................................... 5
   2.3. Method of white cheese making ....................................................................... 5
   2.4. Factors affecting chemical and microbiological quality of white cheese ......... 6
       2.4.1. Acidity ........................................................................................................ 6
       2.4.2. Milk clotting enzymes .............................................................................. 6
       2.4.3. Bacteria in cheese ..................................................................................... 7
       2.4.4. Cheese ripening and storage .................................................................... 7
   2.5. Flavours ........................................................................................................... 8
       2.5.1. Cardamom .................................................................................................. 8
       2.5.2. Cinnamon .................................................................................................. 9
       2.5.3. Fenugreek .................................................................................................. 11

3. Chapter Three: Material and Methods................................................................. 13
   3.1. Study Area ....................................................................................................... 13
   3.1.2. Experimental Design .................................................................................... 13
   3.1.3. Materials .................................................................................................... 13
   3.2. Methods ......................................................................................................... 13
   3.2.1. Cheese manufacture ................................................................................... 13
   3.3. Chemical analysis .......................................................................................... 14
       3.3.1. Titratable acidity of the cheese ................................................................. 14
       3.3.2. Total Solids content ............................................................................... 15
       3.3.3. Protein contents ....................................................................................... 15
       3.3.4. Determination of ash content ................................................................. 16
       3.3.5. Determination of fat content ................................................................... 16
   3.4. Sensory evaluation ......................................................................................... 17
   3.5. Statistical analysis ......................................................................................... 17

4. Chapter Four: Results ............................................................................................ 18
   4.1. Chemical composition of milk ......................................................................... 18
       4.1.1. Effect of the storage period on the chemical composition of the goat’s cheese ......................................................... 18
       4.1.2. Effect of spice types on the chemical composition of goat’s cheese ....... 19
   4.2. Sensory evaluation ......................................................................................... 22
       4.2.1. Effect of storage period on sensory evaluation of the goat’s cheese .......... 22
       4.2.2. Effect of Spices Types on Sensory characteristics of goat’s milk cheese .................................................................. 24
   4.3. Effect of storage period and spices types on the chemical composition of goat’s milk cheese ...... 26
List of tables

4
<table>
<thead>
<tr>
<th>Table No</th>
<th>Table title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Effect of storage period on the chemical composition of goat's cheese</td>
<td>20</td>
</tr>
<tr>
<td>2</td>
<td>Effect of spices types on chemical composition of goat's cheese</td>
<td>21</td>
</tr>
<tr>
<td>3</td>
<td>Effect of storage period on sensory evaluation of goat's cheese</td>
<td>23</td>
</tr>
<tr>
<td>4</td>
<td>Effect of spices type on the sensory evaluation of goat's cheese</td>
<td>25</td>
</tr>
<tr>
<td>5</td>
<td>Changes in the fat content of goat cheese as affected by storage period and spices type</td>
<td>28</td>
</tr>
<tr>
<td>6</td>
<td>Effect of storage period and spices types on the total solids content of goat milk cheese</td>
<td>29</td>
</tr>
<tr>
<td>7</td>
<td>Change in ash (%) of goat's cheese as affected by added spices and storage period</td>
<td>30</td>
</tr>
<tr>
<td>8</td>
<td>Effect of storage period and spices type on protein (%) of goat's cheese</td>
<td>31</td>
</tr>
<tr>
<td>9</td>
<td>Change in titratable acidity (%) of goat's white cheese as affected by spices type and storage period</td>
<td>32</td>
</tr>
<tr>
<td>10</td>
<td>Changed in color of goat cheese during storage as affected by fenugreek, cinnamon and cardamom</td>
<td>34</td>
</tr>
<tr>
<td>11</td>
<td>Changed in taste of goat cheese during storage as affected by fenugreek, cinnamon and cardamom</td>
<td>35</td>
</tr>
<tr>
<td>12</td>
<td>Changed in Texture of goat cheese during storage as affected by spices type and storage period</td>
<td>36</td>
</tr>
<tr>
<td>13</td>
<td>Changes in flavor of the goat milk cheese as affected by storage period and spices types</td>
<td>37</td>
</tr>
<tr>
<td>14</td>
<td>Changed in odour of goat's cheese during storage as affected by spices type.</td>
<td>38</td>
</tr>
</tbody>
</table>
Abstract

The experiment was conducted at the laboratory of Dairy Science and Technology Department, College of Animal Production Science and Technology, Sudan University of Science and Technology during the period 2010 to find out the effect of storage period and spices types on the chemical composition and sensory characteristics of White soft cheese. 60 pounds of goat’s milk purchased from the local market. Four treatments were carried out in this study as follows: First treatment is the control in which the curd of the cheese had no additive. In the second, third and fourth treatments fenugreek, cinnamon and cardamom powder (0.02%) were added to the curd after coagulation, respectively. The obtained cheese were stored in refrigerator at 5ºC for thirty days then samples of each treatment was analyzed after zero, 10, 20 and 30 days of storage for chemical composition and sensory properties.

Statistical analysis of the results showed that acidity, fat, total solid of the cheese in different treatments had no significant differences (p≤0.05). Protein content in the control cheese was lower in comparison with fenugreek, cinnamon and cardamom cheeses. The cheese treated with cardamom had lowest value in ash content, while Fenugreek cheese had the highest value of
ash than other treatments. On the other hand cheeses with spices reduced acidity development especially cheese with cardamom when compared with control.

Statistical analysis of sensory evaluation showed that the addition of fenugreek, cinnamon and cardamom to the cheese improved the quality of white soft cheese and they act as good natural preservatives.