

Dedication

To my dear family,

Father,

Mother,

Brother,

and Sister,

With endless love.

Acknowledgements

Grateful thanks to Alla for assistance, health and patience He has given me to complete this work.

I wish to express my special appreciation and gratitude to my supervisor Assoc Prof Osama El Sheikh for his helpful supervision and proper guidance, patience, kindness attitude, advice and encouragement to carry out this work.

Special thanks and appreciation are due to my family for their patience, encouragement and assistance during the study. Special thanks are due to Dr.Hamid Agab Mohammed for his assistance and encouragement. Many thanks to my uncle Alsafi who typed this thesis.

I would like to reserve my sincere gratitude to all those whom I did not mention and who have contributed in different ways to make the completion of this study possible.

Contents

DEDICATION	I
ACKNOWLEDGEMENTS	II
CONTENTS	III
LIST OF TABLES	V
LIST OF PHOTOGRAPHS	VII
ENGLISH ABSTRACT	VIII
ARABIC ABSTRACT	X
<u>CHAPTER ONE :</u>	1
INTRODUCTION	2
<u>CHAPTER TWO : LITERATURE REVIEW</u>	5
2-1 Camels in the Sudan	6
2-2 Camel herd structure	6
2-3 Camel milk production	7
2-4 Factors affecting camel milk production	7
2-5 Camel milk composition and properties	8
2-5-1 Fat content of camel milk	8
2-5-2 Protein content of camel milk	9
2-5-3 Lactose content of camel milk	9
2-5-4 Mineral content of camel milk	9
2-5-5 Vitamin content of camel milk	10
2-5-6 Water content of camel milk	10
2-5-7 Nutritive value of camel milk (Energy)	10
2-6 Factors affecting camel milk composition	11
2-7 Camel milk quality	11
2-8 Camel milk products and their uses	12
2-8-1 Pasteurized camel milk	13
2-8-2 Camel fermented milk (Gariss)	13

2-8-3 Camel milk cheese	14
2-8-4 Camel milk butter	15
2-8-5 Sweet camel milk	15
2-8-6 Camel milk ice cream	16
2-8-7 Medical prosperities and uses of camel milk	16
<u>CHAPTER THREE: MATERIALS AND METHODS</u>	18
– QUESTIONEERS TO OWNERS AND PRODUCERS	19
– QUESTIONEERS TO CONSUMERS	19
– VISITS AND INTRVIEWS	19
– PREVIOUS LITERATURE REVIEW	19
– ELECTRONIC LIBRARY (UNIVERSITY OF KLHARTOUM)	19
– FOOD RESEARCH CENTER AT SHAMBAT	19
– INTERNET WEB	19
<u>CHAPTER FOUR : RESULTS AND DISCUSSION</u>	32
<u>CHAPTER FIVE : CONCOLOSIONS AND RECOMMENDATIONS</u>	37
5-1 CONCOLOSIONS	38
5-2 RECOMMENDATIONS	40
REFERENCES	41
APPENDICES	51
QUESTIONNAIRES	52
PHOTOGRAPHS	56

1

List of Tables

Table .No	Title	Page
	Tables of camel milk owners and producers	
1	Sex of camel milk owners	20
2	Ages of camel milk owners	20
3	level of education	20
4	Producers careers	21
5	Purpose of camel raising	21
6	Production systems	21
7	Types of camels	22
8	Herd size	22
9	The role of males in a herd	23
10	The milk production of a she-camel (Liters/day	23
11	Calf milk consumption	23
12	Herders family consumption of milk in liters/day	24
13	Milking frequency	24
14	Ways of milk consumption	24
15	Processing products of camel milk	25
16	Uses of camel milk	25
17	The excess camel milk remaining after consumption as food	25
18	Diseases treated by camel milk	26
19	Diseases that affect camel milk production	26
	Tables of camel milk consumers	
20	Sex of samples studied	27
21	Ages	27
22	Educational level	27
23	Consumers careers	28
24	General milk consumption by Area	28
25	Sources of milk	28
26	The knowledge of camel milk sensory (characters(clour, taste and smell	28
27	Possibility of using camel milk for humans	29

	consumption	
28	Camel milk drinking	29
29	(Ways of consuming camel milk(from table 9	29
30	Buying of camel milk	29
31	Processing of camel milk	30
32	Diseases treated by camel milk	30
33	Possibility of raising camels in intensive farms for milk production	30
34	Possibility of marketing camel milk and its processed products	31
35	Investment in camel production	31

List of Photographs

Figure .No	Title	Page
1	(Milking machines in intensive farm system(at Dubai	57
2	(Camel milk production in the world(in million tones	58
3	Milking she-camel with a follower	59
4	Milking she-camels in intensive farm system(at (Gundahar-Omdorman	60
5	Closed System in a camel Ranching farm for milk .(production(at Gundahar-Omdorman	60
6	.Milking she-camels in a camel milk ranch farm	61
7	.(Drinking Camel milk (at Abu Zaid Market	62
8	National Research Centre On Camel (at (Bikaner-India	63

Abstract

This study was conducted in Khartoum State between December-2006 and April-2007 to assess camel milk production and consumption, evaluate the possibility of encouraging and increasing awareness on camel milk consumption and to investigate into favouring and disfavoured factors and conditions affecting camel milk consumption.

The methodology followed by the study included questionnaires to camel owners and producers in Omdorman and Khartoum North. Random samples of 10 persons of potential consumers of multi-occupational jobs of both sexes were selected from each of the three towns Khartoum, Omdorman and Khartoum North to evaluate camel milk. A visit and interviewing of a specialized shop owner for selling fresh and fermented camel milk was made. A visit was also made to the Food Research Center at Shambat and to the electronic library (University of Khartoum). Review of previous literature and documentation and data from the Internet web were also included.

The data was tabulated as frequency tables and simple percentage method of analysis was followed to analyze the results.

The findings of the study showed that 100% of the owners and producers were males due to the nomadic nature of the job and 69.2% of them were either illiterates or of low educational level.

The herd structure was 46.2% males kept with the herd, 30.7% riding animals, 15.4% for meat and 7.7% for racing.

Herd sizes of 1-10 heads were owned by 23.1% of the producers, 10-20 heads by 7.7%, 20-30 heads by 23.1%, 40-100 heads by 15.4% and those above 100 heads by 30.7% respectively.

The average production for a she-camel was 1.5 liters/day and producers family consumption 2-5 liters/ day.

69.2% of the producers preferred fresh milk, 15.4% preferred fermented milk and 15.4% preferred both fresh and fermented.

For the consumers 20% favoured fresh camel milk, 36.7% favoured fermented milk and 43.3% of the sample studied never drank camel milk.

For curing and medicinal treatments 33.3% of the consumers and 38.5% of the producers used it for Gastro-enteritis. 16.7% of the consumers and 30.8% of the producers used it for diabetes, 6.7% of the consumers and 7.7% of the producers for malaria, 15.3% of the producers used it for Jaundice and 7.7% of them for curing Leukaemia.

The most important diseases that affect camel milk production were, Mange at 69.2%, summer diarrhea at 15.4%, Trypanosomiasis 7.7% and camel pox at 7.7%.

For investment in camel production 50% of the sample studied put meat as priority number one followed by 36.7% for milk, 10% for racing and 3.3% put both meat and milk for investment.

المخلص

اجريت هذه الدراسة في ولاية الخرطوم في الفتره من ديسمبر 2006 إلى أبريل 2007 لتقييم وتحديد كميات حليب الابل المنتجة والمستهلكة ودراسة إمكانية رفع الوعي بأهمية وتشجيع استهلاك حليب الابل مع مراعاة المحفزات والمحسّنات من الاسباب والدواعي لإستهلاك حليب الابل. اتبعت طريقة الاستبيانات للمنتجين وأصحاب الإبل في أم درمان والخرطوم بحري والخرطوم وتم الإختيار العشوائي لعشرة أشخاص من المستهلكين لحليب الابل من وظائف وطرق كسب عيش متعددة لتقييم لبن الإبل.

تمت المقابلة الشخصية لصاحب دكان متخصص في بيع حليب الابل " والقارص " أي حليب الابل المتخمر.

تمت زيارة مركز بحوث الاغذية بشمبات والمكتبة الإلكترونية بجامعة الخرطوم لجمع ما توفر من معلومات عن بحوث ودراسات حليب الابل. أيضا تم الدخول في الشبكة الإلكترونية لتجميع المعلومات ذات الصلة. تم تبويب معلومات الدراسة ونتائجها بالجداول التكرارية والنسب المئوية وتم تحليل النتائج وفقا لذلك.

أفادت الدراسة أن كل مالكي وأصحاب الإبل والمنتجين من الذكور بنسبة 100% ويعزى ذلك لطبيعة نظام التربية المترحل وأتضح من الدراسة أن 69.2% منهم إما غير متعلمين أو على درجة متدنية من التعليم الأساسي والأولي.

أوضحت الدراسة أن تركيب القطعان كان بنسبة 46.2% ذكورا محفوظة مع القطيع و 30.7% إبل ركوب و 15.4% إبل لحم و 7.7% إبل سباق. أما حجم القطعان كما أشارت نتائج الدراسة فكانت بنسبة 23.1% يملكون 1-10 رأسا و 7.7% من 10-20 رأسا و 23.1% من 20-30 رأسا و 15.4% من 40-100 رأس وأكثر من 100 رأس 30.7%.

عن الإنتاج اليومي من الحليب للناقة فقد أوردت الدراسة الرقم 1.5 لترا من الحليب يوميا في المتوسط وأن الأسرة الواحدة تستهلك 2-5 لترات من حليب الإبل يوميا.

ولتفضيل الحليب الطازج و " القارص " أشار 69.2% من المنتجين والملاك أنهم يفضلون الحليب الطازج و 15.4% يفضلون " القارص " و 15.4% ليس لهم تفضيل محدد.

أما بالنسبة للمستهلكين فمنهم 20% يفضلون حليب الإبل الطازج و 36.7% يفضلون "القارص" و 43.3% لم يتذوقوا حليب الإبل من قبل. ولإستعمالات حليب الإبل كعلاج لبعض الأمراض أشار 33.3% من المستهلكين و 38.5% من المنتجين والملاك أنهم يستعملونه لعلاج أمراض الجهاز الهضمي وأشار 16.7% من المستهلكين و 30.2% من المنتجين والملاك أنهم يستعملون حليب الإبل لعلاج مرض السكر.

وأفاد 6.7% من المستهلكين و 7.7% من المنتجين و الملاك أنهم يستعملون حليب الإبل لعلاج الملاريا وأفاد 15.3% من الفئة الأخيرة أنهم يستعملونه لعلاج اليرقان كما أفاد 7.7% منهم أنهم يستعملونه لعلاج سرطان الدم.

وأشارت الدراسة إلى أن أهم أمراض الإبل التي تؤثر سلبا على إنتاج الحليب كانت بالترتيب التنازلي مرض الجرب بنسبة 69.2% ثم الإسهالات

الصيفية بنسبة 15.4% ثم مرض الجفار بنسبة 7.7% وجدري الإبل أيضا بنسبة 7.7%.
في مجال الإستثمار في إنتاج الإبل وضع 50% من المستثمرين إنتاج اللحوم كمرتبة أولى ثم إنتاج الحليب بنسبة 36.7% ثم 10% إبل سباق وأفاد 3.3% من عينة الدراسة أن تفضيل الإستثمار تأتي أهميته في إنتاج اللحم والحليب مجتمعين.