

DEDICATION

To my dear mother, to my dear father,

To my brothers and sisters,

To my friends,

To my uncle Brima,

With love and respect

ACKNOWLEDGEMENTS

I wish to express my thanks and appreciation to my supervisor

Prof. Babo Fadalla for his guidance and valuable advice over the whole period spent in this study. I have had the opportunity to learn from his experience and knowledge.

My gratitude is also due to Dr.Hussein Mohie Eldeen Adar Head, Department of Range Science, College of Forestry and Range Sciences, Sudan University of Science and Technology, Khartoum, Sudan.

My thanks are also extended to Ustaz. Khalid Mohamed Hamid, Chairman of Pastoralists' Union who introduced me to farmer Abdel Kareem who gave me access to his farm and helped me while conducting my experiment.

I wish to thank the staff members of the main Laboratory University of Khartoum-Shambat and the Laboratory of Forestry and Range, Sudan University of Science and Technology.

My thanks are extended to my best friends Hager, Jar elnabie, D.marowa, U.nade and all my friend.

My thanks at first and last to Allah whose will made every thing possible.

LIST OF CONTENTS

DEDICATION.....	i
ACKNOWLEDGEMENTS.....	
...ii	
LIST OF CONTENT.....	
.....iii	
LIST OF TABLES.....	
.....vi	
ABSTRACT IN ARABIC.....	
.....vii	
ABSTRACT.....	
x	
CHAPTER ONE INTRODUCTION.....	1
1.1 General.....	1
1.2 Study Area.....	2
1.2.1 Location.....	2
1.2.2 Population of the State.....	2
1.2.3 Climate.....	2
1.2.4 Natural resources.....	3
1.2.4.1 Land resource.....	3
1.2.4.2 Water Resources.....	3
1.2.4.3Underground water.....	3
1.2.4.4 Soil and topography.....	3
1.2.4.5Animal Resources.....	4

1.2.6	Grazing resources.....	4
1.2.7	Rangeland condition.....	4
1.2.8	Vegetations cover.....	4
1.2.9	Land Resources	5
1.2.9.1	Jirouf Land.....	5
1.2.9.2	Gureir Land.....	5
1.2.9.3	High Terrace Land.....	5
1.2.10	Land Tenure and Management.....	5
1.2.11	Irrigation Systems....	
	6
1.2.12	Map of Study Area.....	7
1.3	Research problem and justification.....	8
1.4	Objective.....	8
1.4.1	Specific objectives.....	8
1.5	Expected outcome.....	9
	CHAPTER TWO LITERATUER REVIEW	10
2.1	General	10
2.2	Soil type.....	12
2.3	Land preparation.....	13
2.4	Source of seed and varieties.....	13
2.5	Seed rate.....	14
2.6	Inoculation.....	14
2.7	Sowing date, sowing method and sowing depth.....	14
2.8	Irrigation.....	15
2.8	Fertilizer application.....	15
2.9	Weed control	15
2.10	Plant protection.....	16
2.11	Harvesting.....	16
2.13	Cost of Alfalfa production.....	16

2.14	Area cultivated with non-legume forage in Khartoum State.....	17
CHAPTER THREE MATERIALS AND METHODS.....		18
3.1	Site description.....	18
3.1.1	Location.....	18
3.1.2	Treatments and experimental design.....	18
3.2	Forage yield.....	19
3.2.1	Green yield	19
3.2.2	Dry yield.....	19
3.3.	Crude protein.....	19
3.4.	Data analysis.....	19
CHAPTER FOUR RESULT AND DISCUSSION.....		20
4.1	Productivity of alfalfa.....	20
4.2	Chemical composition of alfalfa.....	21
4.3	Crude protein.....	22
4.4	Alfalfa export.....	23
4.5	Problems facing export of alfalfa.....	24
4.6	Cost of ton of alfalfa Purchase and export.....	24
4.7	Reasons for export of alfalfa.....	26
4.8	Specifications of alfalfa for export.....	27
4.9	Problems facing exporter from the side of the farmer.....	27
4.10	Local trader.....	28
4.10.1	Local price and weight of bundle of alfalfa.....	28
4.10.2	Problems facing the local alfalfa traders from the side of producers.....	30
4.10.3	Main alfalfa markets in Khartoum State.....	30
4.10.4	Reasons for fluctuations in the prices of alfalfa.....	31
4.10.5	Constraints facing local marketing of alfalfa.....	32
4.10.6	Sources from which local berseem traders obtain alfalfa.....	33
CHAPTER FIVE CONCLUSION AND RECOMMENDATIONS		

.....	35
5.1. Conclusion.....	35
5.2. Recommendations.....	36
References.....	37
References in Arabic.....	41
Appendix.....	42

LIST OF TABLES

1 Mean non-legume forage area cultivated (ha), productivity (ton/ha) and total dry matter production (ton) under irrigation in Khartoum state.....	17
2 Mean yield of green and dry matter alfalfa cut at different stages of growth after harvest.....	21
3 Mean yield and crude protein content of alfalfa cut at different stages of growth.....	22
4 Mean yield and crude protein content of alfalfa cut at different stages of growth obtained from regression equation.....	23
5 Method of exporting alfalfa	23
6 Problems facing export of alfalfa.....	24
7 Purchase price of alfalfa from farmer.....	25
8 Cost of ton of alfalfa for export.....	25
9 Breakdown of costs of alfalfa for export as reported by exporter Ahmed.....	26
10 Reasons for the export of alfalfa.....	26
11 Specifications required by importing countries.....	27

12	Problems facing the exporter from farmer side	28
13	local price of bundle of green alfalfa... ..	29
14	Weight of a bundle of green alfalfa.....	30
15	Problems facing the local alfalfa traders from the side of producers.....	30
16	Main markets of alfalfa in Khartoum State.....	31
17	Reasons for fluctuations in the price ofalfalfa.....	32
18	Constraints to local marketing of alfalfa.....	33
19	Current services provided by the government.....	33
20	Sources from which alfalfa is obtained by local traders.....	34

ملخص الدراسة

اجريت تجربة حقلية في اكتوبر 2010 وذلك لدراسة بعض العوامل المؤثرة علي تسويق البرسيم وعلافة مرحلة القطع بمحتواه من البروتين الخام وبناتجفة المادة الجافة. اجريت الدراسة في مسافة 2.1 هكتار. تم اختيار خمسة احواض عشوائيا من تلك المسافة وبدأت عملية القطع للتجربة بعد آخر قطعة نفذها المزارع. كان عمر النبات 7 ايام عند اول قطعة وبعد ذلك تواصل القطع كل ثلاثة ايام باستخدام البرواز 50 × 50 سم حيث يتم اخذ ثلاثة عينات من كل حوض عشوائياً (مسافة الحوض 6×5 م²). تم وزن البرسيم المقطوع وهو أخضر بعد القطع مباشرة ثم جفف في فرن درجة حرارته 65⁰ مئوية لمدة 48 ساعة. ثم اخذ متوسط الاوزان الخضراء والجافة من كل حوض وكرر ذلك حتى شمل جميع الاحواض. واخيرا اخذ متوسط الاوزان من الاحواض الخمسة. و قد كررت نفس الطريقة في بقية القطعات الي نهاية فترة القطع وتم اخذ عينه ممثلة وتحليلها لتقدير نسبة البروتين الخام.

تصميم استبيان لمعرفة الجوانب المتعلقة بتسويق البرسيم في الداخل ومن أجل الصادر.

أشارت النتائج الي وجود فروقات طفيفة في الانتاجية بين هذه الدراسة وبعض الدراسات السابقة حيث بلغت الانتاجية في هذه الدراسة حوالي 1.3 طن في الهكتار مادة جافة / قطعة أو 5.5 طن في الهكتار مادة خضراء في القطعة. هذه الكمية تعادل 15.6 طن في الهكتار مادة جافة اذا قطع 12 قطعة في السنة ويرجع ذلك الي ان اجراء التجربة تم في اكتوبر والمعلوم ان الانتاجية في هذا الشهر قليلة مقارنة بالشتاء.

اظهرت النتائج انه لا يوجد مبرر لقطع النبات في عمر 10-13 يوم للحصول علي نسبة بروتين 23% حيث ينتج عن ذلك فقد 64% من المادة الجافة اي ما يعادل 816 كجم/الهكتار. كما اشارت الدراسة الي أن نسبة البروتين الخام تساوي 17.5% عند قطع النبات في عمر 30 يوم بينما احتياجات أبقار اللبن من البروتين الخام في حدود 14-19% وبالتالي لا مبرر لقطع في مراحل مبكرة مع ما يلزم ذلك من فقد في المادة الجافة.

ايضا اظهرت الدراسة ان اهم الدول التي يصدر اليها البرسيم جاف هي الكويت والامارات و قطر وقد أكد 83% من المستجوبين ان البرسيم يصدر بواسطة الافراد والسبب الرئيسي لتصدير البرسيم هو ان الاسعار الخارجية افضل من السعر المحلي. وبلغت تكلفة تصدير الطن 400-450 دولار بحسب ما ذكر 50% من المستجوبين كما ذكروا أن سعر البيع في الدول المستوردة 750 دولار وهذا يشير الي ربح يقدر بحوالي 309 دولار للطن الواحد.

كما اشارت الدراسة الي أن سعر ربطة البرسيم (التي تزن 22 كيلوجرام) يرتفع في فصل الصيف حيث يصل الي 6-8 جنيه وفي الشتاء يصل الي 4-5 جنيه ويصل اقصي ارتفاع له في فصل الخريف 7-9 جنيه وان متوسط وزن الربطة 22 كجم واهم الاسواق المحلية التي يباع فيها البرسيم هي سوق امدرمان (سوق الجبل) وان كل التجار المحليين يتحصلون علي البرسيم من مزارع غير مزارعهم .

اوضحت الدراسة ان حاجة سوق الصادر 5000 طن شهريا من البرسيم الجاف ومايتوفر له فقط 2000 طن شهريا وهناك فجوة تقدر بحوالي 3000 طن شهريا.

ABSTRACT

A field experiment was carried out during October 2010 to study some of the factors affecting marketing of berseem (*Medicago sativa L.*) and the effect of the stage of cutting on crude protein content and on dry matter yield.

The alfalfa used in this study is variety *hegazi* which is commercially grown in the Sudan. An area of 2.1hectar was allocated, by a farmer, for the experiment on condition that samples will be taken at specific intervals after the farmer cuts his plot. Samples were obtained first at 7 days after harvest and there after at 3 day intervals until the farmer gets his next harvest which occurs usually between 21 and 30 days after the first harvest. A plot of a size of 6x5 m² was randomly selected from each hectar. Three samples were taken from each plot using a quadrat (0.5x0.5 m²) Samples were weighed in the field and there dried in an oven at a temperature of 65 degree Celsius to determine dry matter production.

A questionnaire was designed to determine the status of local price and export price of alfalfa.

Green yield, dry matter yield and crude protein percent were assessed. Dry matter yield from a single cut at 30 days of age was 1.3 tons/ha/cut. This amounts to 15.6 tons /ha/ year assuming 12 cuts/ year. In terms of green matter yield from this experiment was 5.5 tons /ha/cut when alfalfa was cut at 30 days of age.

The results indicated that there is no justification to harvest alfalfa at an age of 10-13days to obtain 23% of CP as this leads to a loss of 64% in dry matter or (816kg/ha), while harvesting at 30 days gives 17.5% CP. The latter figure is within the range of CP requirement in the diets of dairy cattle (14-19%).

The results showed that all exported alfalfa goes to the Gulf States (United Arab Emirates, Qatar and Kuwait). Some 83% of the respondents reported that alfalfa was exported by individuals. The main reason for export of alfalfa is the high price at export markets which exceeds local price as reported by 83% of the respondents. The major problem facing alfalfa trade was the difficulties faced in transfer of foreign currency as reported by all respondents. Export prices of alfalfa were reported by 50% of the respondents as 400-450 US\$/ton average. Sale price at export markets was about 750 US\$, while all costs incurred were 441 US\$, giving a net profit of 309 US\$ /ton.

The study has shown that the price of a bundle of alfalfa is lowest in winter at 4-5 SDG/bundle as reported by 83% of the respondents. Prices in summer were higher than those reported in winter; this was reported by 89.6% of the respondents who stated a price of bundle at 6-8 SDG. The highest prices of alfalfa were reported in the rainy season (autumn). The average weight of a bundle of alfalfa was 22kg, the most important market of alfalfa is Omdurman (Gabal market) and all alfalfa traded in the local markets of Khartoum State is obtained from non-trader farms.

The study concluded that when cutting alfalfa at the age of 30 days, a dry matter yield 1.3 ton/ha/cut, and a crude protein content of 17.5% were obtained. This gives a satisfactory dry matter yield and a crude protein content within the range recommended for dairy cattle.