

## **ACKNOWLEDGEMENTS**

In the name of Allah, the most Gracious, Most Merciful.

I would like to thank the Almighty Allah for enabling me to conduct this investigation.

The author wishes to express her deep appreciation and gratitude to her supervisor Dr. Abubakr Ibrahim Mohammed Hussein, Senior Expert Arab Institute for Planning Kuwait, for his sound advice, supervision and constructive criticism which he has given throughout the progress of the work.

Acknowledgement is expressed to my Co-supervisor Prof. Mohamed Abdel Salam, Dean Graduate Studies College -Sudan University of Science and Technology, for his tangible assistance and advice.

I am particularly indebted to Prof. Osama Elshiekh, Prof. Omer AdelRahim ElKhidir and Prof. Hisham Ismail Seri for their valuable help and for their excellent scientific services they provided.

I would like also to express my sincere thanks and appreciation to my family for kindness and encouragement.

My thanks are also due to close friends and colleagues who have supported and encouraged me in this endeavor.

To them all and to others who assisted me in numerous ways, I wish to express my gratitude for their kind encouragement and help.

## ABSTRACT

The objective of the study is to assess the role of the producers' awareness on sheep productivity, production and sustainability and to assess the effect of the livestock programs and projects on the producer development. A study was conducted in North and West Kordofan States during the period 2013 – 2015 in five localities; Sheikan and Sodari in North Kordofan State, Elkhoei, ElNuhood and Gebaish in West Kordofan State, the study Targeted the sheep producers as 90% of the live animal Sudan exports are sheep of which 26.5% come from Kordofan States. A stratified random sample of 234 producers from the five localities was selected. The data collected was analyzed using Statistical Package for Social Sciences (SPSS). The data analysis comprised descriptive statistical analysis indicators including the Chi-Square test for data. The results showed that the majority of the producers, about 85.2%, follow the traditional open grazing system with no statistical difference ( $P > 0.05$ ) between the localities. The animal production systems for sheep are variable nomadic, semi sedentary and sedentary at 60.4%. The majority showed a herd size ranges of between 50 to 200 heads and the herd structure are inconsistent; animals raised mostly building up the stock initially and secondary for production. No records either on the herds are kept or on the production. Birth giving is not economical, about of 88.1% of the ewes give birth once per annum with very low or no twinning in majority of herds. About 84% depend on natural open grazing as the main feed source for sheep. For animal treatment 84.2% depend on themselves and only 54.9% vaccinate their animals but irregularly. The study showed that few, 53 %, of the producers go for productivity improvement as most of them rely on personal experience and friends or neighbors experience. Some 24.4% rely on nutrition betterment for improving productivity by increasing grazing rate and 50.9% accept genetic improvement

for increasing productivity but they lack the know-how and facilities. 88.5% sell live animals when in cash need and in the local markets with no statistical difference ( $P > 0.05$ ) between the localities. Producers do not practice transformation industries which makes them lose the added value. For risk aversion 86% of the producers do not go for animal insurance. The results showed the low number of producer societies or unions or their ineffectiveness as 80.3% do not group or participate in any. 80.4% of the producers stated that the animal resources programs or projects executed in the study area did not reflect any effect in their improvement. 87.6% of them declared that they were never involved or headed to or participated in such programs or projects. 42.3% of the producers stated that none of such programs or projects was executed in their areas. From the above results, the study concludes that the economic awareness of the sheep producers in Kordofan States is not up to a sound level, which leads to intangible benefits to the producers as relates to the methods and means of production improvement at their geographical domains with their fewness, in addition to the limited or meager effect of the executed programs or projects in the study area on raising the awareness or producers development. This necessitates involvement of the producers in the redevelopment programs intended to elevate their economic awareness towards economic production and vision for sheep rising. This also demands elevating educational apprenticeship levels and culture to make them accept new development ideas and modern technology for adoption and spreading of sustainable development.

## المستخلص

هدفت الدراسة إلى تقييم وعي المنتجين بالقيمة الاقتصادية للضأن في تطوير وتنمية الإنتاجية والإنتاج واستدامة التنمية وأيضاً تحديد مدى تأثير برامج ومشاريع تنمية الثروة الحيوانية في تنمية منتجي الضأن. أجريت الدراسة في ولايتي شمال وغرب كردفان في الفترة ٢٠١٣-٢٠١٥ في خمس محليات شملت شيكان وسودري في ولاية شمال كردفان، الخوي والنهود وغبيش في ولاية غرب كردفان، استهدفت منتجي الضأن لأن نسبة ٩٠% من صادر الحيوانات الحي من السودان ضأن و ٢٦,٥% من صادر الضأن يجلب من ولايات كردفان. تم اختيار عينة من ٢٣٤ منتج من الخمس محليات بالولائتين بالطريقة الطبقيّة العشوائية. حللت البيانات باستخدام المؤشرات الإحصائية الوصفية (SPSS) واختبار مربع كاي (Chi-Square). أوضحت النتائج أن غالبية المنتجين ٨٥,٢% يتبعون نظام الإنتاج التقليدي بالرعي الطبيعي المفتوح وأن الاختلاف بين المحليات غير معنوي ( $P > 0.05$ ). انماط تربية ورعاية الضأن متعددة تشمل: مترحلة او مستقرة او شبة مستقرة . أوضحت النتائج أن حوالي ٦٠,٤% من المنتجين يتبعون النمط المستقر، حجم القطيع يتراوح بين ٥٠ الي ٢٠٠ رأس وأن تركيبة القطيع غير منتظمة وأن اغلبيّة التربية من اجل زيادة القطيع اولا وزيادة الانتاج ثانيا، كما أنه لا توجد سجلات لحفظ معلومات القطيع، نظام الانتاج والتوليد غير اقتصادي فنسبة ٨٨,١% من الاناث (النعاج) تولد مرة واحدة في السنة ونسبة التوائم في المواليد متدنية جدا او منعدمة في بعض القطعان، مصدر التغذية الرئيسي للضأن المرعي الطبيعي المفتوح ٨٤%. يعتمد اغلبيّة المنتجين ٨٤,٣% على أنفسهم في علاج الحيوانات المريضة، التطعيم ينفذ بنسبة ٥٤,٩% من غير انتظام، اثبتت الدراسة محدودية سعي المنتجين لتحسين الانتاجية حيث أن ٥٣% من المنتجين يسعون الي تحسين القطيع ولكن يعتمد اغلبيتهم على خبرتهم الشخصية وخبرة اصدقائهم وجيرانهم و ٢٤,٤% من المنتجين يعتمدون علي تحسين التغذية بزيادة الرعي كوسيلة لتطوير الانتاجية والانتاج، يوافق ٥٠,٩% من المنتجين على استخدام اساليب التحسين الوراثي لتحسين الانتاجية ولكن لا تتوفر لديهم المعلومات والوسائل. تتحصر الاستفادة الاقتصادية ببيع الحيوان حي بنسبة ٨٨,٥% في الأسواق المحلية عند الحاجة المادية ولا توجد اختلافات معنوية بين المحليات الخمسة ( $P > 0.05$ )، كما لا يقوم المنتجين بصناعات تحويلية استثمارية مما يفقدهم الاستفادة من القيمة المضافة، ترتفع مخاطر خسائر التربية حيث أن ٨٦% من المنتجين لا يؤمنون علي

حيواناتهم . اوضحت النتائج قلة أو عدم فعالية الجمعيات الإنتاجية والاتحادات حيث أن ٨٠,٣% من المنتجين لا يشتركون في هذه الجمعيات. ذكر ٨٠,٤% من المنتجين ان المشاريع والبرامج التنموية للثروة الحيوانية المنفذة في منطقة الدراسة لم تحدث لديهم اي تطوير او تأثير وأكد ٨٧,٦% انه ليس لديهم علم او مشاركة في هذه البرامج والمشاريع وذكر ٤٢,٣% من المنتجين انه لم تنفذ في مناطقهم اي مشاريع او برامج لتنمية الثروة الحيوانية، مما سبق تخلص الدراسة الي أن وعي المنتجين بالقيمة الاقتصادية للضأن في ولايات كردفان متدني جدا وهذا يؤدي الي عدم استفادتهم من سبل و وسائل تحسين الانتاج من خلال البرامج او المشاريع الموجودة في المنطقة علي قلتها وايضا محدودية او عدم تأثير البرامج و المشاريع التنموية المنفذة في منطقة الدراسة في تطوير و تنمية وعي المنتجين، مما يستوجب اشراك المنتجين في برامج التنمية وزيادة توعيتهم وتعليمهم للتوجه للإنتاج الاقتصادي والرؤية الاقتصادية في تربية الضأن حيث أن ارتفاع المستوي التعليمي و الثقافي للمنتجين يساعد علي تقبلهم للأفكار التنموية الجديدة و التكنولوجيا الحديثة و تبنيهم وتطبيقهم لها و نشرها و بالتالي استدامة التنمية.

# TABLE OF CONTENTS

<b>Content</b>	<b>Page No.</b>
ACKNOWLEDGMENTS.....	i
ABSTRACT.....	ii
ARABIC ABSTRACT.....	iv
TABLE OF CONTENTS.....	vi
LIST OF TABLES.....	vii
LIST OF FIGURES.....	xvi
LIST OF APPENDIXES.....	xvii
LIST OF PHOTOES.....	vi
<b>CHAPTER ONE: INTRODUCTION</b>	<b>1</b>
1.1 Research Problem.....	4
1.2 Study Objectives.....	4
1.3 Research Hypotheses.....	5
1.4 Study Importance.....	6
<b>CHAPTER TWO: LITERATURE REVIEW</b>	<b>7</b>
2.1 Economic Importance of the Animal Resources.....	7
2.1.1 Participation of the Livestock Sectors in the National Economy.....	7
2.1.2 Comparing Prices of Animal Products with other Commodities.....	9
2.1.2.1 International Meat and Hide Prices.....	9
2.1.2.2 Prices of Sudanese Livestock Exports.....	10
2.2 International Prices of Some Abattoir by-Products	10
2.3 The National Livestock Aims.....	11

2.4	Importance of Veterinary Services.....	11
2.5	The Veterinarians, Veterinary Coverage and Social Participation.....	12
2.6	Obstructions Impeding Offering ..... Veterinary Services in Sudan .....	12
2.6.1	Geographical Factors and Infrastructure.....	12
2.7	Limited Number of Veterinary Cadre Working in Traditional Areas.....	13
2.8	Legal Problems and Constrains in Livestock Sector Development.....	13
2.8.1	Problems and Constrains.....	13
2.9	Management Practices and Resource Utilization.....	14
2.10	Folk Resource Management.....	15
2.11	Local Species Preservation.....	15
2.12	Local Knowledge in Breeding and Genetic Resource Management.....	16
2.12.1	The Main Obstacles Facing Folk Management and Veterinary Services .....	18
2.12.2	Some of the Solutions Offered .....	18
2.13	Animal Production System.....	19
2.13.1	Animal Production System in Sudan.....	19
2.14	The Marketing System.....	19
2.14.1	Commercial Agreements.....	19
2.14.2	Animal Resources Marketing System.....	20

2.14.3	Marketing Obstacles.....	21
2.15	Perception of Development.....	22
2.16	The Rural Development Concept.....	25
2.17	Sustainable Development.....	27
2.18	Understanding the Concept of Rural Extension....	28
2.18.1	Veterinary and Animal Husbandry Extension.....	28
2.18.2	Objectives of Extension Work.....	29
2.18.3	Roles for Extension.....	29
2.18.4	Background of the Extension in Sudan.....	30
2.18.4.1	Network Management.....	31
2.18.4.1.1	Extension and Technology Transfer.....	31
2.18.4.1.2	Department of Development Sponsors.....	32
2.18.4.1.3	Department of Pastoral organizations.....	32
2.18.4.1.4	Documentation Management and Communications	32
2.18.5	Extension Situations in the Sudan .....	33
2.18.5.1	Crop-Based and Animal Health-Based Extension....	33
2.18.5.2	Improving Livestock Production Extension.....	33
2.18.5.3	Livestock Extension within Crop-Based Systems...	34
2.18.6.4	Production Extension via Specialist Services.....	35
2.18.5.5	Production Extension within Animal Health Services	36
2.18.6	Extension Gap.....	37
2.19	Communication for Development.....	38
2.19.1	Definition of Communication.....	38
2.19.2	Communication Processes within Extension Systems	39
2.19.3	Role of Communication in an Extension System...	57
2.19.4	Persuasion Versus Education.....	40



2.19.5	Development Communication.....	42
2.20	Extension and Veterinary Public Health.....	42
2.20.1	Veterinary Public Health.....	42
2.20.2	Herd Health.....	44
2.20.3	Animal Health Services.....	46
2.20.4	Targeting Poverty and Improved Livelihoods.....	47
2.20.5	The Impacts of Animal Diseases.....	51
2.21	Programme Development and Planned Change.....	53
2.22	Difficulties of Participation.....	56
2.22.1	The Arguments for Participation in Development...	58
2.22.2	Elements of Effective Participation.....	59
2.23	Characteristics of the Community Based Organization	59
2.24	Social Mobilization.....	62
2.25	The Self-Help Group (SHG).....	65
2.26	Gender and Development.....	66
	<b>CHAPTER THREE: METHODOLOGY</b>	<b>68</b>
3.1	Study Area.....	68
3.1.1	Study Area Description.....	68
3.2	Population of the Study.....	69
3.3	Data Collection.....	69
3.3.1	Primary Data Collection.....	69
3.3.1.1	Questionnaires.....	69
3.3.1.2	Interview.....	70
3.3.1.3	Directs Observation.....	70
3.3.2	Secondary data collection.....	70
3.3.3	Sampling Selection, Size and Calculation.....	70

3.3.3.1	Sample selection.....	70
3.3.3.2	Sample Size.....	73
3.3.3.3	Sample Calculation.....	73
3.3.4	Data Analysis.....	74
<b>CHAPTER FOUR: RESULTS</b>		<b>75</b>
4.1	Results of Sheep Producer Questionnaires	75
4.1.1	Sheep Producers Family Status.....	75
4.1.2	Herd Management.....	76
4.1.2.1	Sheep Breeding Pattern.....	76
4.1.2.2	Sheep Production System.....	77
4.1.2.3	Sheep Feeding.....	84
4.1.3	Veterinary Services and Herd Health.....	86
4.1.4	Productivity and Production Improvement.....	91
4.1.5	Breeding Problems.....	93
4.1.6	Economic Benefits of Sheep and Sheep Products	95
4.1.7	Institutions' that Provide Animal Resources Development Services.....	97
4.1.8	Livestock Insurance.....	100
4.1.9	Participate or Link with Union or Production Group.....	101
4.2	Institutional Role.....	101
4.2.1	General Goals of the Institution.....	101
4.3	Secondary Data Analysis.....	106
4.4	Observations.....	107

**CHAPTER FIVE: DISCUSSION, CONCLUSIONS AND RECOMMENATIONS** 113

5.1 Discussion..... 113

5.2 Conclusions..... 118

5.3 Recommendations..... 120

REFERENCES..... 122

APPENDICES..... 141

## LIST OF TABLES

Table No.	Title	Page
2.1	International prices of meat and hides and other commodities .....	9
2.2	Comparison between livestock international prices, cotton, alfalfa, and petroleum prices (August, 2015) .....	10
3.1	Enumeration of animal resources in North Kordofan States.	71
3.2	Veterinary services distribution in North Kordofan State....	72
3.3	Estimation of the number of livestock producers, locality population weight and number of sheep producers in the study localities.....	74
4.1	Frequency distribution of respondents by Family size.....	75
4.2	Frequency distribution of producers by education level.....	75
4.3	Frequency distribution of Children by educational level.....	76
4.4	Cross tabulation of sheep breeding pattern by locality.....	76
4.5	Cross tabulation of animal production system by localities....	77
4.6	Frequency distribution of animal care taker.....	78
4.7	Time allowed for animal care.....	78
4.8	Frequency distribution of females in the herds.....	79
4.9	Frequency distribution of males in the herds.....	80
4.10	Frequency distribution of sheep by sex in the herds.....	80
4.11	Criteria for best sheep selection.....	81
4.12	Type of sheds and fencing.....	81
4.13	Animal identification system.....	82

4.14	Reproductive efficiency and birth rate.....	82
4.15	Age of lambs when separated from their mothers.....	83
4.16	After being separated from the mothers distribution of females.....	83
4.17	After being separated from the mothers distribution of male.....	83
4.18	Type of sheep feeds.....	83
4.19	Time of feeding additives .....	84
4.20	Sources of sheep feed.....	86
4.21	Water Sources in the study area.....	85
4.22	Frequency of veterinary services distribution in the area as viewed by the respondents.....	86
4.23	Source of Veterinary drugs.....	86
4.24	Cross tabulation of animals treatment by localities.....	87
4.25	Frequency of deworming.....	88
4.26	Cross tabulation of regularity of vaccination by localities....	88
4.27	Reasons for not vaccinating animals regularly.....	89
4.28	The most convenient (best) time for vaccination of animals.....	89
4.29	Reasons for selecting the specified vaccination times.....	90
4.30	Crosstabulation of animal breeding pattern and vaccinate Regularly.....	90
4.31	Sharing experiences and trials with others .....	91
4.32	Reasoning for disagree of genetic improvement.....	93
4.33	Animal production problems.....	93

4.34	Producers improvement proposals.....	94
4.35	Animal marketing by sex.....	95
4.36	Animal price determination.....	96
4.37	Institutions that provide animal resources development services.....	97
4.38	Services provided by animal resources institutions.....	97
4.39	Programme execution methodology by institution.....	98
4.40	Effect of programmes and projects on human development in the study area.....	99
4.41	Development created.....	99
4.42	Presence of intensive production projects or farms.....	99
4.43	Obstacles facing the institutions for programme execution.....	100
4.44	Reasons and justifications of no- insurance.....	100
4.45	Reasons and justifications for no link.....	101
4.46	General Goals of the Institutions.....	101
4.47	Goals Related to Animal Producers.....	102
4.48	The targets of animal resources development programs.....	102
4.49	The obstacles that prevent the institutions from achieving the goals.....	103
4.50	Services provided by institutions.....	103
4.51	Follow-up and evaluation of the performance of producers participating in a project.....	104
4.52	Means to Increase Productivity and Production.....	104

4.53	Extent of participation of producers in developing programs.....	105
4.54	Animal resources projects presence.....	105
4.55	Institution have animal resources project previously.....	105

## LIST OF FIGURES

<b>Figure No</b>	<b>Title</b>	<b>Page No.</b>
2.1	Sudanese meat export during the period 1995 – 2014	8
2.2	Comparison between total Sudanese meat exports in tons, in comparison with mutton and lamb exports during the period 1995 – 2014.....	8
2.3	National livestock Identification System.....	14
2.4	Building Development.....	24
2.5	Objective tree for rural development project	55
2.6	Recommended extension methods for use at different stages of adoption.....	55
3.1	Animal distribution in North Kordofan State (2011)	71
3.2	Veterinary services distribution in North Kordofan State 2011) .....	73
4.1	Animal production system in the study area.....	78
4.2	Methods of increasing productivity by the producers in the study area.....	92
4.3	Economic benefits from animals and their products.....	95
4.4	Selling in the animals market.....	96
4.5	Participation in designing program and execution of proposed projects.....	95



## LIST OF APPENDICES

<b>Appendix No.</b>	<b>Title</b>	<b>Page No</b>
1	North Kordofan State map.....	141
2	Lie on the pastoralists traveling .....	142
3	Trade Roots Company, Limited.....	143
4	Institutions questionnaire.....	144
5	Producer questionnaire.....	149

## LIST OF PHOTOES

<b>Photo No</b>	<b>Title</b>	<b>Page No.</b>
4.1	Producers family status (poor life) .....	108
4.2	Suggested model of typical village as presented by Extension Depatment,2015.....	108
4.3	Water sources (Haffir), non-healthy environment...	109
4.4	Model of healthy water stations.....	109
4.5	Obtainable the pasture in autumn season but rare in summer season.....	110
4.6	ElNuhood livestock Market (Improving Livestock Production and Marketing Project,2015) .....	110
4.7	Middle men estimate the sheep price at the discretion of its size by the naked eye.....	111
4.8	local livestock markets in ElKowai.....	111
4.9	Sheep protecting themselves from the hot sun by the shadow of the trees.....	111
4.10	Sheep herds are usually left grazing freely in open pastures.....	112
4.11	A Nomadic Life (difficult life) .....	112