UNIVERSITI PUTRA MALAYSIA

EFFECT ECOLOGICAL RANGELAND MANAGEMENT ON LIVESTOCK PRODUCTION OF SETTLED NOMADS IN THE BAKKAN REGION OF SOUTHERAN IRAN

GHOLAM REZA BADJIAN.

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By

GHOLAM REZA BADJIAN

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia in Fulfillment of the Requirement for the Degree of Doctor of Philosophy

August 2005

To my family

I would like to dedicate this body of work to the nomads of Bakkan for whom we envision a better life and look for inspiration. I hope that in my own little way I have been able to make a difference in their lives.

Abstract of the thesis presented to the Senate of Universiti Putra Malaysia in fulfillment of the requirement for the Degree of Doctor of Philosophy

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Chairman: Professor Dahlan Ismail, PhD

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The Nomad Production System (NPS) in Bakkan covers four new villages (RSNs), two old villages (PSNs) and other nomads who migrate yearly (NSN). The NPS has two major. sub-systems, namely, the Cropland Production System (CPS) and the highland Range Production System (hRPS). These systems are linked together by grazing energy intake models of the sheep and goats under the NPS. This study focused on the identification and analysis of the components of the NPS during one complete year in the Bakkan distinct, located in Southern Iran. Therefore, the objectives of the study are: (1) To identify and describe the current components of a hRPS and their interactions; (2) To analyze CPS and its components as an alternative option to increase the yield and efficiency of rangeland production, considering the impact of water availability; (3) To identify the components of a grazing ruminant production system and their interactions; (4) To estimate and analyze changes in the distribution of cropland/rangeland income by farm size, and changes in rangeland allocation as a result of nomadic settlement; and finally (5) To evaluate the implications of the nomads' decisions on resource use.

Based on the study objectives, an approach system was determined to be the best way of recognizing the effects of, and the relationships between the components. Since nomads are the main part of this dynamic system, modeling and simulating them is the most effective way to study and assess this complex system.

Economic evaluation was another part of the study that was done based on a cost/benefit analysis method. Surveys were used as a technique to gather data, from interviews with nomads and the heads of their groups over a period of six months.
The GIS tool helped to prepare different layers of features and attributes of the Proper Use Factors (PUF) model to show the integrated components of the PUF model in the Available Forage (AF) of highland Range Production System.

In conclusion, it was found that NSN, during wet and drought years, have a proportion of 9-10% of the whole production capacity in Bakkan. NSN have good pasture lands with proper condition and trend, and with suitable soil and slope properties. RSNs have a proportion of 53-57% of the whole production capacity in Bakkan during wet and drought years. PSN1 and PSN2, with about 26 years and 100 years of settlement in Bakkan, respectively, have more farming and animal husbandry experience in comparison to the RSNs. Therefore, they would be expected to have higher crop production rates, to use better range management techniques, and to observe proper carrying capacity (CC) limits in comparison with the others. These observations validate the generalized structure of the energy utilization models of grazing sheep under the different feeding and production systems, and these models can be coupled with the appropriate models of feeds and feeding systems in

rangeland, cropland, and hand feeding systems. These results will enable the prediction of CC in any given situation under conditions similar to those in Bakkan.

Finally, the sensitivity analysis used to derive the benefit/cost (B/C) ratio of the project "with settlement", and with a longer sustainable life cycle, showed much less economic efficiency than the project "without settlement" due to the consideration of ecological effects in the former case. In the latest settlement project, it was seen that discounting effects are not noticeable unless environmental benefits significantly outweigh the influence of the cost savings benefit of the "without settlement" project.

Keywords: Bakkan region, Ecological rangeland management, Livestock production, Settled nomads, Southern Iran.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia
sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

KESAN PENGURUSAN EKOLOGI RANGELAND KE ATAS PRODUKSI TERNAKAN NOMAD BERTEMPAT DI KAWASAN BAKKAN SELATAN IRAN

Oleh

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Sistem produksi nomad (NPS) di Bakkan meliputi empat perkampongan baru, RSNs, dua perkampongan lama PSNs, dan sebahagian nomad yang berpindah setiap tahun (NSN). NPS mempunyai dua sub-sistem major, saperti Sistem Produksi Kawasan Tanaman (CPS) dan Sistem Produksi Banjaran Tanah Tinggi (hRPS). Sistem-sistem ini di bentuk dengan gabungan model-model produksi foraj/herbage, dan model-model keperluan tenaga bebiri/kambing di dalam NPS. Kajian ini memberi fokas kepada pengenalan dan analisa komponen-komponen dari NPS semasa satu tahun lengkap di Daerah Bakkan, yang terletak di selatan Iran. Dengan itu, objektif kajian adalah : (1) Untuk mengenal dan membincang komponen semasa sistem produksi rangeland dan interaksi mereka ; (2) Untuk analisa produksi kawasan tanaman dan komponen-komponen nya sebagai pilihan alternatif untuk menambah hasil dan kecekapan produksi rangeland, mengambilkira impak kesediaadaan air ; (3) Untuk mengenal komponen-komponen sistem produksi ragutan ruminan dan interaksi antara mereka ; (4) Untuk menganggar dan analisa perubahan dalam taburan pendapatan kawasan tanaman/rangeland dengan saiz ladang, dan perubahan dalam

penempatan nomad ; dan (5) Untuk menilai implikasi keputusan nomad keatas kegunaan sumber.

Berasaskan objektif kajian, pendekatan sistem telah dikenalpasti sebagai kaedah terbaik mengenali kesan-kesan, dan pertalian antara komponen-komponen. Oleh kerana nomad adalah bahagian utama dalam sistem dinamik ini, kaedah modeling dan simulasi adalah yang paling berkesan untuk kajian dan penilaian sistem kompleks ini.

Penilaian ekonomi adalah bahagian seterusnya dalam kajian ini yang dijalankan berdasarkan kaedah analisa kos/faedah (cost/benefit analysis method). Bancian telah dijalankan sebagai teknik pengumpulan data, melalui temuduga nomad dan ketua-ketua kompulan mereka selama enam bulan. Peralatan GIS menolong penyediaan lapisan-lapisan yang berbeza dari sifat-sifat dan pertalian model faktor guna patut (Profer Use Factors – PUF) untuk menunjukkan integrasi komponen-komponen model PUF dalam foraj tersedia (Available Forage – AF) di hRPS.

Kesimpulan, diketahui bahawa NSN, semasa tahun-tahun lembab dan kering, keupayaan produksi hanya 9-10% dari keseluruhan bahagian di Bakkan. NSN mempunyai kawasan pastura dengan keadaan yang sesuai dan berarah-tuju, dan dengan kesesuaian sifat-sifat tanah dan cerun. PSNs mempunyai keupayaan produksi 53-57% dari keseluruhan bahagian di Bakkan semasa tahun-tahun lembab dan kering. PSN1 dan PSN2, dengan 26 tahun dan 100 tahun penempatan di Bakkan, berturutan, mempunyai pengalaman yang lebih dalam pengurusan perladangan dan ternakan jika di bandingkan dengan RSNs. Dengan sebab itu, boleh dijangkakan mereka mempunyai kadar produksi tanaman yang lebih tinggi, boleh mengunakan teknik pengurusan ladang yang lebih baik dan boleh mengawasi had-had keupayaan muatan (CC) yang lebih baik jika di bandingkan dengan lain-lain kawasan. Pengamatan ini mengesahkan struktur umum model pengunaan tenaga bebiri meragut di bawah pemakanan dan sistem produksi yang berbeza boleh dipakai, dan model-model ini boleh di hubungkan dengan model makanan dan sistem pemakanan yang sesuai dalam sistem rangeland, kawasan tanaman dan pemberian makanan dengan tangan. Keputusan kajian ini membolehkan ramalan keupayaan muatan di buat dalam sebarang situasi yang sama dengan Bakkan.

Akhirnya, analisa sensitiviti yang digunakan untuk menghasilkan nisbah faedah/kos (B/C ratio) projek "dengan penempatan" dan dengan putaran hidup lestari yang lebih lama, telah menunjukkan ia nya kurang keupayaan ekonomi dari projek "tanpa penempatan", disebabkan penekanan kepada kesan ekologi dalam kes terawal. Dalam projek penempatan terkini, telah didapati kesan 'discounting' tidak kelihatan melainkan kebaikan kepada alam sekitar yang nyata melebihi pengaruh kebaikkan kos simpanan projek "tanpa penempatan".

Kekunci perkataan : Kawasan Bakkan, Pengurusan ekologi rangeland, Produksi ternakan, Penempatan Nomad, Selatan Iran.

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TABLE OF CONTENTS

	Page
DEDICATION	iii, ii
ABSTRACT	iv
ABSTRAK	vi
ACKNOWLEDMENTS	x
APPROVAL	xii
DECLARATION	xiv
LIST OF TABLES	xxi
LIST OF FIGURES	xxv
LIST OF ABREVIATIONS	xxviii

CHAPTER

1 **INTRODUCTION**
- 1.1 Integration of nomads, rangeland, livestock and cropland in a nomadic production system (NPS) in Iran — 1
- 1.2 Nomads in Iran — 3
- 1.3 Nomads' livestock and animal husbandry — 5
- 1.4 Statement of the problem — 7
- 1.5 Overall goal of the study — 10
- 1.6 Guiding Principles — 10
- 1.7 Initiatives for sustainable livelihoods — 11
- 1.8 Rationale and objectives of the study — 13
  - 1.8.1 The specific objectives of the research — 13
- 1.9 Location — 14

2 **LITERATURE REVIEW**
- 2.1 Background of Pastoral Nomadic Production Systems — 17
- 2.2 Nomadic pastorals and their migration — 19
- 2.3 Similar problems elsewhere — 20
  - 2.3.1 Bedouin in Syria — 20
  - 2.3.2 Turkish livelihood — 23
  - 2.3.3 Jordanian nomads — 24
- 2.4 Terminology — 25
  - 2.4.1 Model and modeling — 25
  - 2.4.2 Types of models — 26
  - 2.4.3 Simulation — 27
  - 2.4.4 System — 28
  - 2.4.5 Methods in development of the models — 30
- 2.5 Reported works in Nomadic Production Systems — 32

2.6 Concepts of modeling and simulation in Animal-Agriculture Production systems 36
2.7 Reported work on production of sheep in Animal-Rangeland-Cropland integration 40
2.7.1 Rangeland Production Systems 47
2.7.2 Cropland Production Systems 49
2.7.3 Animal Production Systems 49
2.8 The Potential of GIS-based Approaches 50
2.9 Reported work on socio/economic evaluation of Animal-Rangeland- Cropland integrated productions Systems 52
2.10 Data collection methods 53

3 **THE DEVELOPMENT OF CONCEPTUAL MODELS OF NOMADIC PRODUCTION SYSTEMS (NPS)**
3.1 Introduction 55
3.2 Conceptual model of the RSN production system 57
3.3 Conceptual model of the PSN production system 58
3.4 Conceptual model of forage production 60
3.5 Livestock energy requirement model 63
3.6 Precipitation and water requirement study 68
3.7 Computer simulation and programming languages 69

4 **BOTANICAL COMPOSITION, AVAILABLE FORAGE (AF) AND AVAILABLE METABOLIZABLE ENERGY (MEA) MODELS OF HIGHLAND RANGE PRODUCTION SYSTEMS (hRPS)**
4.1 Introduction 70
4.2 Materials and methods 71
4.2.1 Distribution of precipitation 71
4.2.2 Vegetation composition model 74
4.2.3 Forage production model 76
4.2.4 Influence of precipitation on botanical composition 76
4.2.5 Influence of water on stocking rates 78
4.2.6 Geography Information System (GIS) 80
4.2.7 Grazing or animal preference model 81
4.2.8 Available Forage model (AF) 93
4.2.9 Metabolizable Energy Content of feed model 94
4.2.10 Model of Metabolizable Energy Availability in hRPS 94
4.3 Results and discussion 95
4.3.1 Identified botanical compositions and vegetation types 95
4.3.2 Soil types properties of the highland rangeland 97
4.3.3 Slope types properties of the highland rangeland 100
4.3.4 Digitized feature of rangeland condition and its attribute 103
4.3.5 Digitized feature of rangeland trend and its attribute 104

4.3.6 Integrated factors of soil and slope properties, rangeland condition, trend, and their effect on vegetation type 105
4.3.7 Available forage of vegetation types 106
4.3.8 Nutritive value of forage 107

5 **FORAGE PRODUCTION, AVAILABLE FORAGE (AF) AND NUTRIENT VALUES IN hRPS UNDER SAMMAN ORFI (SO)**
5.1 Introduction 110
5.2 Materials and methods 111
5.2.1 Measuring the areas of vegetation types and SAMMAN ORFI (SO) 111
5.2.2 Measuring the PUF component areas 111
5.2.3 Forage production, available forage and nutrient values of the rangeland in SO 111
5.3 Results and discussion 112
5.3.1 The traditional rangeland boundaries 112
5.3.2 Forage production of PSN1 113
5.3.3 Forage production of PSN2 117
5.3.4 Forage production of RSN1 120
5.3.5 Forage production of RSN2 123
5.3.6 Forage production of RSN3 126
5.3.7 Forage production of RSN4 129
5.3.8 Forage production of NSN 132
5.4 Conclusions 135

6 **FORAGE PRODUCTION AND NUTRIENT VALUES OF CROPS AND RESIDUES OF CPS BELONGING TO RSNs AND PSNs**
6.1 Introduction 136
6.2 Materials and methods 137
6.2.1 Usage of survey for identification of crop types 137
6.2.2 Using the GIS for estimation of croplands' area 138
6.2.3 Using of studies' results for estimation of water requirements 139
6.2.4 Crop yield and cropland residues' production model 140
6.2.5 Nutrient values of crops and cropland residues 141
6.3 Results and discussion 142
6.3.1 Relationship between the mean of produced grain and straw 142
6.3.2 Soil characteristics of cropland 143
6.3.3 Slope characteristics of cropland 144
6.3.4 Integrated properties of slope and soil 145
6.3.5 Cropland area related to water supply and integrated properties of soil and slope 146

	6.3.6	Nutrient values of Crop types	148
	6.3.7	Nutrient values of produced crop belonging to RSN1	149
	6.3.8	Nutrient values of produced crop belonging to RSN2	149
	6.3.9	Nutrient values of produced crop belonging to RSN3	150
	6.3.10	Nutrient values of produced crop belonging to RSN4	151
	6.3.11	Nutrient values of produced crop belonging to PSN1	152
	6.3.12	Nutrient values of produced crop belonging to PSN2	153
6.4	Conclusions		154

7 **VOLUNTARY INTAKE OF GRAZING ANIMALS IN NPS**

7.1	Introduction		157
7.2	Materials and methods		158
	7.2.1	Data collection	158
	7.2.2	Grazing period and management	159
	7.2.3	Grazing period of goats among feeds source systems	160
	7.2.4	Estimation of voluntary intake of sheep and goats	161
	7.2.5	Estimation of metabolism energy intake	163
	7.2.6	Physical activity	165
	7.2.7	Data analysis	167
7.3	Results and discussion		167
	7.3.1	Dry matter digestibility value of herbage in feeding resources systems	167
	7.3.2	Grazing period on feeds sources	169
	7.3.3	Relationship between grazing period and animal physiological status in feeds sources during wet years	171
	7.3.4	Relationship between grazing period and animal physiological status in feeds sources during drought years	173
	7.3.5	Relationship between dry matter digestibility and Dry matter intake	175
	7.3.6	Impact of drought on stages of physiological status of sheep and goats	177
	7.3.7	Voluntary Intake of sheep in different physiological statuses	180
	7.3.8	Voluntary Intake of goats in different physiological statues	185
	7.3.9	Sex differences affecting voluntary intake	188
	7.3.10	Compare of metabolizable energy intake (MEVI) in Bakkan	188
7.4	Conclusions		192

8 ENERGY UTILIZATION MODELS OF GRAZING SHEEP/GOATS AND CARRYING CAPACITY IN NPS

8.1	Introduction	194
8.2	Relationship between energy consumption of animals and topography	195

8.3	Estimation of metabolizable energy intake in pen-fed (hand feeding) system		196
	8.3.1	Roughage and supplementary intake	196
	8.3.2	Estimate of ME requirements in pen-fed feeding system	198
8.4	Estimation of metabolizable energy intake in hRPS and CPS		206
	8.4.1	Grazing intake in hRPS	206
	8.4.2	Crop residues intake in CPS	207
	8.4.3	Estimate of ME requirements in hRPS and CPS	209
8.5	Estimation of ME requirement for sheep/goats herd		214
8.6	Estimation of carrying capacity (CC)		215
	8.6.1	Carrying capacity in highland range Production System (hRPS)	215
	8.6.2	Carrying capacity in Cropland Production System (CPS)	216
8.7	Results and discussion		217
	8.7.1	ME requirement of grazing sheep/goats herd	217
	8.7.2	Determination of carrying capacity in highland range	220
	8.7.3	Determination of cropland capacity	228
	8.7.4	Impact of weather on carrying capacity	232
8.8	Conclusions		233

9 **VALIDATION OF ENERGY UTILIZATION MODELS IN GRAZING SYSTEMS**

9.1	Introduction		235
9.2	Materials and Methods		235
	9.2.1	Data sources	235
	9.2.2	Data on performance of Torki Ghashghaii (TG) sheep herd in Neyriz station	236
9.3	Validation of weaners' growth based on metabolizable energy intake models		241
9.4	Validation of grazing Torki breed sheep' body weight changes based on models of energy utilization and intake		242
9.5	Results and discussion		245
9.6	Conclusions		249

10 **COST/BENEFIT ANALYSIS OF NOMAD SETTLEMENT PROJECT BASED ON NOMADIC PRODUCTION SYSTEM (NPS)**

10.1	Introduction		251
10.2	Materials and methods		254
	10.2.1	Site selection	254
	10.2.2	Decision rules	255
	10.2.3	Sensitivity analysis	262
	10.2.4	Choice of an option	263
10.3	Results and discussion		264
	10.3.1	Benefit and cost of rangeland and animal husbandry	264

10.3.2 Benefit and cost of farming activity 265
10.3.3 Capabilities of the projects 266
10.3.4 Assumptions of cost and benefit values 269
10.3.5 Benefit/Cost ratio 270
10.3.6 Incremental Net Present Value (INPV) 271
10.4 Sensitivity analysis with the effect of discount rate on the benefit-cost ratio 275
10.5 Conclusions 276

11 **GENERAL CONCLUSION AND DISCUSION**
11.1 Scope of the study 281
11.2 Conclusions 283
11.2.1 Development of the Models 283
11.2.2 Carrying Capacity 287
11.2.3 Economic considerations 288
11.3 Verifications and validations 290
11.4 Suggestions for further studies 291

REFERENCES 294
APPENDICES 307
BIODATA OF THE AUTHOR 325

LIST OF TABLES

Table		Page
4.1	Coefficient rates of soil types for usage in the PUF calculation	87
4.2	Useable coefficient rates of slope properties in Bakkan	88
4.3	Coefficient rating of Rangeland Trend and Condition	90
4.4	Relationship between vegetation classes (palatability) and range condition	91
4.5	The forage production of vegetation types (VT) among the botanical compositions	97
4.6	The specific area of vegetation types based on soil groups in hRPS in Bakkan	99
4.7	The specific area of vegetation types based on slope groups in hRPS in Bakkan	102
4.8	The specific area of vegetation types based on integration of slope, soil, range trend, and range condition groups in hRPS in Bakkan	106
4.9	Chemical composition and nutrition values of species in hRPS	108
5.1	The vegetation type areas within the traditional boundaries of rangeland (SO) in Bakkan	114
5.2	Available forage and nutrient values of PSN1	116
5.3	Available forage and nutrient values of PSN2	119
5.4	Available forage and nutrient values of RSN1	122
5.5	Available forage and nutrient values of RSN2	125
5.6	Available forage and nutrient values of RSN3	128
5.7	Available forage and nutrient values of RSN4	131
5.8	Available forage and nutrient values of NSN	134
5.9	The mean production of available forage (AF) and available metabolizable energy (MEA) among RSNs, PSNs, and NSN during wet and drought years	135
6.1	The characteristics of the population, family and farming groups among the SAMAN ORFI (SO) in Bakkan	137

6.2	The relationship between the produced grain and straw of wheat farms in Bakkan	142
6.3	Cropland area, consisting of cultivated, irrigated, and rain fed area among PSNs and RSNs in Bakkan	147
6.4	Nutritive values of crop types and residues in Bakkan	148
6.5	Area, yield, and nutrient values of crop residuals in RSN1	149
6.6	Area, yield, and nutrient values of crop residuals in RSN2	150
6.7	Area, yield, and nutrient values of crop residuals in RSN3	152
6.8	Area, yield, and nutrient values of crop residuals in RSN4	146
6.9	Area, yield, and nutrient values of crop residuals in PSN1	153
6.10	Area, yield, and nutrient values of crop residuals in PSN2	154
6.11	The comparison of total and mean yield, residues, metabolizable energy, and crude protein of crop types of PSNs and RSNs	155
7.1	Gross energy (GE) and metabolizability content of herbage and samples in three feeding systems	164
7.2	The means, standard deviation, and range of dry matter digestibility value(DMD) of herbage available in three feeding (production) systems	168
7.3	Grazing duration of nomads' herds in four grazing systems	170
7.4	Calculation of voluntary dry matter intake (DMI) and dry matter digestibility value (DMD) among RSNs, PSNs, and NSN in the feeding systems – Bakkan	176
7.5	The impact of drought years on the dependency of physiological statuses of ewe/doe on feeding resource systems among PSNs, RSNs, and NSN in Bakkan	179
7.6	Metabolizable energy voluntary intake (MEVI) of sheep herds with effect of various physiological statuses occurring in highland range feeding systems in Bakkan	183
7.7	Metabolizable energy voluntary intake (MEVI) of sheep herds with effect of various physiological statuses occurring in cropland feeding systems in Bakkan	184
7.8	Metabolizable energy voluntary intake (MEVI) of goatherds with effects of various physiological status occurrences in highland range feeding systems in Bakkan	186

7.9	Metabolizable energy voluntary intake (MEVI) of goatherds with effects of various physiological status occurrences in cropland feeding systems in Bakkan	187
7.10	The overall mean of metabolizable energy voluntary intake of does in various physiological statuses in four feeding resource systems among PSNs, RSNs, and NSN in Bakkan during wet/drought years	190
7.11	The overall mean of metabolizable energy voluntary intake of ewes in various physiological statuses in four feeding source systems among PSNs, RSNs, and NSN in Bakkan during wet/drought years	191
8.1	Slope percent and area of highland range in different sites in Bakkan	196
8.2	Relationship between steep slope (percentage) and energy for grazing	211
8.3	Metabolizable energy requirement (MER) of goat herds in four feeds and feeding systems during wet years in Bakkan	221
8.4	Metabolizable energy requirement of goat herds in four feeds and feeding systems during drought years in Bakkan	222
8.5	Metabolizable energy requirements (MER)of sheep herds in four feeds and feeding systems during wet years in Bakkan	223
8.6	Metabolizable energy requirements of sheep herds in four feeding systems during drought years in Bakkan	224
8.7	Carrying capacity (CC) of highland range for sheep herds during wet and drought years	226
8.8	Carrying capacity (CC) of highland range for goat herds during wet and drought years	227
8.9	Cropland capacity (CC) for sheep flocks based on cropland yield and residues during wet and drought years	230
8.10	Cropland capacity (CC) for goats herd based on cropland yield and residues during wet and drought years	231
8.11	Total capacity of cropland and highland range in Bakkan based on herd composition	233
9.1	Feeding of Torki Ghashghaii (TG) ewes, rams, and lambs during the year	239
9.2	The mean body weight changes of Male/Female lambs (1996-99) at different ages	240
9.3	The mean body weight changes of ewes and rams during one year (1996-9)	240