A Survey of Pasture Management Practices on the Canadian Prairies With Emphasis on Rotational Grazing and Managed Riparian Areas

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And, finally, we wish to express our sincere gratitude to the 346 producers who took the time from their busy schedules to fill out a lengthy, in-depth questionnaire and for sharing their experiences with us and with the readers of this report. We hope the report will make some contribution to your efforts for sustainable and profitable livestock production.

Any errors or omissions in this report are solely the responsibility of the authors.

Executive Summary

A survey was conducted, over the three prairie provinces, of producers known to be using pasture and riparian management. Survey results were used to develop a descriptive profile of respondents' current operating and management practices, based on 1999. Respondents were also asked to report on observed changes to a number of factors after adoption of their current practices, including changes to income, livestock and pasture productivity, and habitat. The response rate for the mailout survey was 41%.

Characterization of respondents and their grazing system:

- Respondents represented experienced livestock producers who depend heavily on livestock for their farm income. Respondents were primarily in the 30 to 45 years of age group, followed by the 46 to 60 years of age group.
- Respondents represented all sizes of operations, with 47% having pasture resources of less than 500 acres, 25% between 500 and 1,000 acres, and 28% operating over 1,000 acres.
- Pasture improvement practices were important to respondents; 54% reseeded and 50% fertilized their pastures.
- Most respondents were making use of rotational grazing systems on their pastures.
- Close to two thirds of respondents are relatively new to rotational grazing, with 10 years of experience or less.
- There was considerable variability to rotational grazing systems. Most producers grazed each paddock two or three times, and almost 20% of respondents grazed some pastures or paddocks four times or more per year. Seeded pastures were grazed over more than native pastures. A small number of producers only grazed paddocks or pastures once and then rested them for the rest of the year.
- Respondents determined the time spent in each paddock or pasture mainly by forage height (66% of respondents) and percent of pasture utilized (41% of respondents).

The main trends for livestock production on respondents' rotation systems:

- Respondents were primarily cow/calf operators.
- Just over half of respondents kept livestock on their rotation system for 4 to 6 months.
- Two thirds of respondents grazed less than 0.26 animals per acre (beef animals only).

- Forty percent of respondents had stocking rates of less than one AUM/acre and 39% had 1.0 to 1.9 AUM/acre.

- Forty-seven percent of respondents had total calf gains of 31 to 75 pounds per acre, and 23% had gains of 76 to 150 pounds per acre.

- When comparing more intensively managed pastures to less intensively managed pastures, stocking rates were higher in the more intensive pastures. The majority of respondents in the intensive group (53%) had stocking rates of 1.0 to 1.9 AUM/acre, whereas the majority of respondents in the less intensive group (52%) had stocking rates less than 1 AUM/acre.

- For total calf gains per acre, while both groups had the majority of their respondents in the 31 to 75 pound per acre range (51% for the intensively managed group and 46% for the less intensively managed group), the more intensively managed pastures had more respondents gaining over 75 pounds per acre (40%) compared to the less intensive group (31%).

Producers who changed to rotational grazing from some previous management system (primarily continuous grazing) have observed numerous improvements for both livestock and forage productivity:

- When comparing their current system to their previous system, 80% of respondents reported livestock average weight gain was greater, 91% reported pasture forage production quantity was greater, 88% reported pasture forage production quality was greater, and 53% of respondents reported overwintering costs were lower for 1999 compared to the last year of their previous system.

- This increased livestock and forage productivity has enabled producers to observe positive economic changes under their current pasture management system, with 88% reporting that net farm income for the livestock enterprise was greater than it had been under the last year of their previous management system; 10% reported no difference.

- To achieve added returns and improved forage productivity, 83% of respondents had greater labor requirements and 86% had greater planning time requirements. For the majority of respondents, the increase for both of these factors was from 1 to 25% over their previous system. Many producers, however, made comments in their returned surveys that the benefits of rotational grazing made the extra labor and planning requirements worthwhile. Many also made comments that the more intensive management kept them more aware of their herd and of the individual livestock requirements.

- In comparing producers' current system to the last year of their previous system, separating out the impacts of inflation, and changes in price and management practices on livestock productivity and profitability would require a more detailed, indepth level of study, particularly since the last year of their previous system will vary by producer.

- The greater proportion of respondents reported no change between their current and previous systems for herd health costs, pasture re-seeding, fertilizer use on pasture, weed/brush control, supplemental feeding, and hayland and stubble grazing. However, those that did observe changes in these areas showed a pattern of lower herd health costs, more fertilizing, weed control, and hayland grazing, and less supplemental feeding and stubble grazing.

- Producers attributed improvements to livestock productivity primarily from improved forage quantity, quality and utilization, with close to 85% of respondents rating each of these factors as important to very important factors in productivity gains. Cleaner drinking water was also recognized as an important factor toward better animal productivity by 64% of respondents.

- Fifty-seven percent of respondents attributed livestock production gains to improvements made to their breeding stock.

- Another 43% indicated improvements to their herd health program has also made important contributions to livestock production gains (although 61% of respondents indicated that herd health costs were no different under their current system and 30% indicated they were lower.)

- Producers attributed forage improvements to the rest and grazing patterns of rotational grazing, with 97% of respondents rating this factor as important to very important.

- Comparing stocking rates and calf weight gains for respondents with a previous system to that of the aggregate whole of the current system, shows a similar distribution of respondents in the various categories, with the previous system showing only a slightly larger proportion of respondents in the lower stocking rate and weight gain categories. For the previous system, 88% of respondents had stocking rates under 2.0 AUM/acre compared to 80% of respondents for the current system. Regarding total calf gain per acre, 75% of respondents had gains of 75 pounds per acre or less for their previous system, compared to 67% of respondents for the current system.

For water resources on pasture, use of surface water bodies and the land surrounding these water bodies (riparian areas):

- Fifty percent of respondents indicated they fenced off some of their surface water bodies, and of those that indicated the amount of land fenced off, 72% had 20 acres or less of adjacent land fenced off.

- Of the respondents that indicated the type of access livestock are given to this fenced off area, 53% gave livestock no access, 40% gave restricted access, and 13% gave free access. Livestock have had restricted or no access to the fenced off area for less than five years for 46% of respondents.

- Respondents that indicated their change in net income between their current rotation system and their previous grazing management system were separated into two groups; those that control access to riparian areas and those that do not. Both groups had a high percentage of respondents that indicated net income was greater under their current system; riparian management did not reduce the proportion of respondents that experienced an increase in net returns from the livestock operation under their current rotation system.

Reasons for adopting changes to pasture management, observations respondents have made since adopting changes, and new capital costs incurred for making changes:

- Producers stated the main reasons for adopting their current pasture management system were to improve their pasture condition and the long-term sustainability of their land resources (rated as important by 96% and 92% of respondents, respectively). Increasing stocking rate and improving income were also rated as important by 82% and 80% of respondents; improving wildlife habitat was recognized but given less importance (43% rated as important). However improved wildlife habitat and cleaner water were high on their list of observed changes.

- The highest proportion of respondents who rated reasons for giving livestock restricted or no access to water bodies cited long-term sustainability of surface water bodies and improvement of water quality for livestock as important to very important reasons (87% and 86% of respondents, respectively).

- Since they made changes to their pasture management system, the majority of respondents have observed improved cover for nesting waterfowl (71% of respondents), improved livestock health and condition (72%), improved cover for upland game (60%), and improved water quality of surface water bodies (68%). Of respondents that control access to riparian areas, 78% of respondents noticed an improvement in water, compared to 51% of respondents that do not riparian manage.

- New capital costs for establishing rotational systems and/or fencing off surface water bodies were less than $7 per acre for 38% of respondents, between $7 and $14 per acre for 18% of respondents, and between $15 and $29 per acre for 23% of respondents. Regarding constraints to adopting new grazing management techniques, 73% of respondents rated financial requirements as an important to very important constraint. Labor and management requirements and a lack of sufficient water supply were also considered important to very important by 63%, 59%, and 59% of respondents, respectively.

Respondent's future plans and their information needs:

- Future plans and changes for the respondents featured expansion of their livestock herd (66% of respondents), water development (49% of respondents) and riparian management (37% of respondents), improving their seeding and fertilization strategies (38% and 33% of respondents, respectively), and changing their rotation strategies (30% of respondents).

- Primary information needs were about pasture establishment, managing forage production, and learning about alternative grazing systems.

The respondents to this survey were very enthusiastic about their pasture management systems. This was shown by their willingness to complete a questionnaire containing over fifty questions. Many of them enclosed long descriptions of their experiences and diagrams of their systems. Seventy-three percent of respondents indicated they would either be willing or may be willing to participate in a long-term, more detailed economic study of this topic. Most of these said they would require financial or technical assistance in the areas of record-keeping and weighing livestock on or off pasture. The study has succeeded in identifying a source of farm data for further research into the economics of pasture management systems with emphasis on rotational grazing and riparian management.

Two recommendations were given to build upon the present study.

- It is recommended that interested agencies seize the opportunity provided by the high number of respondents who indicated a definite or possible interest in co-operating in a more detailed, long-term economic study. The design of such a study would be based on precise records and accounts and could examine the impact of a number of conditions on livestock and forage productivity, and producer costs and benefits.

- It is further recommended that the detailed descriptions of respondents' systems and experiences given in the final open-ended question, be compiled, edited and produced as a non-technical extension bulletin. Such a bulletin would be of interest to producers currently practicing, and those interested in adopting, such strategies, as well as government agencies, conservation groups, and cattle associations with interests in such areas.

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Companion Documents[1]

Pasture Survey Questionnaire
Answers to Open-ended Sections of Survey Questions

[1]Companion documents are available by contacting:
Tim Sopuck, Manitoba Habitat Heritage Corporation
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1 Introduction

Farmers and ranchers have grazed their livestock on the western Canadian prairies since early settlement. These settlement patterns, along with availability of native forage and water, determined where and when particular areas were grazed. Over time, lands were fenced to keep livestock in specific locations. More intensive settlement and land use resulted in improved and managed pastures to increase livestock carrying capacity.

The long-term growth of the Canadian cattle population has put pressure on the acres initially allocated to native and improved pastures. This pressure has resulted in instances of overgrazing, stream pollution and soil degradation. Recent changes in agricultural policy that eliminated grain transportation subsidies has reduced or eliminated grain farming profits in many areas. This has been magnified by current low grain prices. There is a general reallocation of farm resources from the traditional grain and oilseed for export to more intensive and expanded livestock enterprises. Plus, current high cattle prices and high steer/feedgrain price ratios (which provides an indicator of cattle profitability), provides incentives for increased cattle production. Many of these enterprises have significant grazing requirements.

These changes have increased producers' interest in managing pasture grazing resources. In general, the farm business has become more financially dependent on the profitability of that livestock enterprise. Cow-calf or stocker enterprises that used to be secondary or insignificant to the whole farm operation have taken on a primary position in the farm economics of many producers. There appears need for more productivity in the short run as well as for long-term sustainability. Overgrazing, loss of production and the consequential soil degradation need to be avoided.

Producers are also aware that greater pressure on their pasture lands can damage water quality and natural habitat of wildlife and fish. Protecting this habitat requires producers to invest scarce funds and make operational changes. The costs and benefits associated with this have not yet been well defined for either the short or long run.

Government and conservation agencies have responded to these concerns. There are incentive programs that provide all or part of the investment required to protect the environment. There is some research completed and in progress to measure environmental and production changes. Extension programs, demonstrations and pasture management courses have been available across the prairies for several years. All of these initiatives to promote economic and environmental benefits have been supported by the aforementioned government and conservation agencies.

A number of relevant papers and reports provide for background information. A review of literature pertaining to the Economic Benefit of Wetland Protection from Livestock[1] concluded, among other things, that "... various management practices are available to farmers to enable them to protect wetlands and

[1]Ecological Agriculture Projects, Faculty of Agricultural and Environmental Sciences, McGill University, *Economic Benefit of Wetland Protection from Livestock: Review of Literature*, Final Report to the Canadian Farm Business Management Council, Jan., 1998.

riparian areas, and improve forage quality by restricting access by livestock. Intuition and anecdotal evidence suggests that these practices do have economic benefits. However, there is little formal economic analysis to substantiate .... costs and benefits related to these practices." The review goes on to recommend a multi-site study to quantify costs and benefits.

A literature review for an unpublished case study by Chorney (1998)[2], suggests that past studies comparing rotational and continuous grazing have found mixed results, and that stocking rates, distribution of livestock, water source and historic use of pastures could be more important factors than the type of system used. However, this case farm analysis of a cow-calf operation in southwestern Manitoba did show economic gains for the rotational grazing/riparian area conservation system used in 1996 and 1997 over continuous grazing the same pasture in 1995. The conclusions are limited somewhat by the fact that weight gains for calves were based on weight at market (i.e. the cattle were not weighed on pastures) and based upon producer recall back to 1995. It was also noted that pasture and herd genetic improvements took place between 1995 and 1997.

Studies by Manske (1994 and 1995)[3] attributed significant biological and economic benefits to a Twice Over Rotational Grazing System. These conclusions, based on an eleven year study from 1983-1994, compared five different types of grazing systems.

Due to the relevance of these kinds of research results, incentives to protect riparian areas and promotion of rotational grazing are found in current programs available to producers.

The Manitoba Habitat Heritage Corporation (MHHC) initiated the present study with financial and/or technical support from Ducks Unlimited (DU), the Prairie Farm Rehabilitation Administration (PFRA), the Canadian Cattlemen's Association (CCA), the Manitoba Cattle Producer's Association (MCPA), the Saskatchewan Wetlands Conservation Corporation (SWCC), Manitoba Agriculture and Food, and Alberta Agriculture Food and Rural Development. The Department of Agricultural Economics and Farm Management of the University of Manitoba, supported by a grant from MHHC, conducted the research and authored this report.

1.1 Research objectives and methodology

1.1.1 Research objectives

This study focuses on establishing a profile of producers practicing pasture and riparian area management. A riparian area is the vegetative zone surrounding surface water bodies, and is considered important for

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[2]Chorney, B., *A Case Farm Economic Assessment of Rotation Grazing*, Faculty of Agricultural Economics and Farm Management, University of Manitoba, unpublished paper, 1998.

[3]Manske, L.L., *Grazing Management for Northern Great Plains Rangeland,* DREC 94-1004, 1994; and *Economic Returns as Affected by Grazing Strategies*, DREC 95-1012, 1995, North Dakota State University, Dickenson Research Extension Center.

providing wildlife habitat, for maintaining shore bank integrity, and for serving as a filtering system for runoff water. The profile will describe:

- the physical features and management of producers' grazing operations;
- specific techniques regarding management of livestock access to forage and water; and
- perceived economic costs and benefits associated with management practices.

Specific research objectives are to:

- identify producers currently practicing pasture and riparian area management in Manitoba, Saskatchewan and Alberta;
- develop a questionnaire to gather economic and physical information about grazing enterprises operated by these producers;
- analyze this information to provide a description of current operating and management practices based on 1999, and focus on the perceived effects upon pasture resources, herd management, and producer income; and
- lay the groundwork for possible future research by identifying producers who are willing to provide records and participate in a detailed multi-year economic study; and the advisory and financial assistance producers require to do so.

1.1.2 Methodology

Steering Committee. The study supporters and researchers established a steering committee to guide and advise research activities and assist in identifying producers to survey. The committee was made up of the researchers, representatives from each supporting organization, and personnel from environmental and government agencies taking part in pasture management extension and research programs. A list of steering committee members can be found in the Appendix to this report.

Questionnaire. A questionnaire was developed to gather information required to meet the listed objectives. After input from the steering committee, a pre-test questionnaire was sent to thirty-three producers. These producers had been identified and contacted by steering committee members and asked to complete the pre-test questionnaire based upon their own farm operation. Twenty-three producers completed the questionnaire, as well as a form evaluating the questionnaire and the process. Clarification needs and suggestions were minor; these were taken into account, resulting in a slightly revised final questionnaire. This completed the objective of questionnaire development. A copy of the questionnaire is available as a companion document to this report by contacting the MHHC as indicated in the Table of Contents.

Respondents were asked a number of questions on their current grazing program and the water resources on their pastures. Respondents were asked to identify whether their current pasture grazing program could best be described as continuous grazing or rotational grazing based on the following given definitions:

Continuous grazing: Placing livestock on pasture in spring and allowing them free access to all or most of the pasture for the entire grazing season until removed in fall.

Rotational grazing: Rotating livestock between pastures through the grazing season, or making use of cross-fencing to divide the pasture into paddocks (also referred to by some as fields) and rotating livestock between these paddocks or fields through the grazing season, providing a period of rest to the unoccupied pastures or paddocks.

Respondents that made use of a rotational grazing management system were asked a number of questions on their current grazing programs and the livestock kept on their rotation system, as well as questions on any past grazing management system that differed from their current system. Respondents were also asked to make comparisons between their current system and their previous system. Questions on their current grazing program were based on 1999 events and practices; while questions for their previous management system were to be based on the last year of their previous management system.

Respondents were directed to answer questions based on pastures owned or rented by their farm operation and not to include information on practices and animals kept on co-operative or community pastures. Respondents that rotation grazed were asked to answer questions with regards only to practices and livestock kept on their rotation system. Respondents that continuous grazed only were not asked to give any details on livestock and were not asked any information on past management practices, but were asked to respond to the sections of the survey concerning the characterization of their livestock operation, the general questions on their current grazing management program, and their information and research requirements.

Survey List. Steering committee members used their contacts and organizations' extension and field workers' client lists to provide names and addresses of producers actively managing their grazing and/or riparian areas. Names for Alberta's mailing list came mainly from a database kept by Alberta Agriculture Food and Rural Development of producers who would be willing to take part in research surveys. This database was searched for producers with grazing resources and the identified producers were phoned by Alberta Agriculture Food and Rural Development staff to verify they were taking part in pasture management and to determine if they would be willing to take part in the survey. Manitoba's and Saskatchewan's mailing lists came mainly from various sources within MHHC, DU, PFRA, and SWCC of producers thought to be taking part in pasture or riparian management.

Prior to submitting their lists to the researchers, the steering committee member (or contact) notified producers that their names had been submitted for survey. The producer was expecting the survey before it arrived. This completed the objective of identifying producers to survey.

Administration of Mail-out Questionnaire. Mail-outs took place over a three-week period in January 2000. Producers were asked to return completed questionnaires within three weeks. Completed questionnaires started to come back almost immediately and most were returned well within the three-week requested time. Pre-testers were sent a personalized second questionnaire, asking only those questions affected by revisions to the pre-test they had originally completed. This enabled researchers to use information from the pre-test consistent with the total survey population.

Analysis of Producer Information. Producer responses to each question were entered in a Quattro-Pro spreadsheet. Separate spreadsheets were developed for each province. The three spreadsheets were merged to provide an overall picture of the Prairies. As an objective of the study was to provide a description of producers' operating and management practices and their perceived effects, the analysis of the survey data is of a qualitative descriptive nature through a series of charts and tables. The charts and tables show the trends among respondents for the various questions in the survey. Because of the volume of information here, and because again, the intent was to provide a descriptive profile, no tests have been conducted to determine statistical significance of any trends or observations.

The report format is intended to be user friendly such that readers can easily focus on their areas of interest, making use of either the charts or tables alone, or utilizing the charts and tables along with the text portions of the report. As some questions did not pertain to all producers surveyed, or some producers chose not to answer all questions, the distributions and percentages given in charts and tables were calculated based on the number of respondents for that question. The number of respondents is given in each chart or table. Comparisons of activities, productivity, or attitudes were achieved through sorting by the relevant variable.

Most questions were constructed to give producers a selection of answers from which to choose, with an open-ended space given for the respondent to fill in their own answer for a selection not offered. Responses to these open-ended portions of questions are included in the companion document to this report, *Answers to Open-ended Sections of Survey Questions*, which is available by contacting MHHC as indicated in the Table of Contents.

1.2 Report organization

The report focuses on an overall prairie perspective, with the text section highlighting the results presented in the accompanying tables and figures. Tables are embedded within the relevant sections of the report, and figures are given in a separate Figures Section following the text. Results are presented in the same sequence as the questionnaire asked for information. These are:

- Characterization of respondents and their land base

- Respondents' current grazing program
- Livestock production on the rotational grazing system
- Comparison with pasture under previous management
- Pasture water resource management
- Characterization of current pasture management program
- Respondents' information needs and research reports

A separate section considers any notable divergence of each province's results from the total prairie provinces. The Summary and Conclusions describes findings and conclusions. The Appendix lists steering committee members and a description of how stocking rates were calculated.

2 Characterization of Respondents and Their Land Base

2.1 Number and location of respondents

A total of 862 questionnaires were mailed to producers along with a covering letter identifying study objectives and organizations supporting and conducting the study. Ten of these were returned unopened by the post office due to no forwarding address, 12 were returned by producers who had retired or were no longer operating a grazing enterprise. This left a total of 840 possible respondents. One other producer returned the questionnaire because he did not wish to fill it out, and, therefore, is considered a no response. Three hundred and forty six completed questionnaires were returned, giving a response rate of 41.2%. Mail outs and returns by province are presented in Table 2.1. This high response rate may be attributed to the interest respondents have in pasture management techniques and also to the manner in which the survey mail out list was compiled. Producers were selected as known to be either practicing or having an interest in grazing or riparian management.

Characterization of respondents and their pasture and other land resources are illustrated in Figures 2.1 to 2.6 and Tables 2.2 to 2.5. The main observations are summarized in the following subsections.

Table 2.1: A Summary of Mailed and Completed Questionnaires, by Province

Province	Surveys Mailed	Returned Completed	Percent Response
Manitoba	341	138	40.5%
Saskatchewan	306	103	33.7%
Alberta	215	105	48.8%
Less Cancelled Surveys[1]	-22		
Totals	840	346	41.2%

[1]Cancelled surveys were unopened returns by post office or producers no longer operating.

2.2 Characterization of respondents

In general, respondents represent experienced livestock producers who depend heavily on livestock for their farm income.

- Almost half of respondents were in the 30 - 45 year age group and almost 40% were in the 46 - 60 years group; 10% were over 60 years of age and only 3.5% were under 30 years of age (Figure 2.1).

- The respondents were experienced in livestock production. Almost half of the respondents (47%) have been involved in livestock production between 16 and 30 years, 31% for more than 30 years, and about 22% for 15 years or less (Figure 2.2).

- Livestock production was an important component of respondents' farm operations. Forty three percent of respondents obtained over 75% of farm income from livestock, 22% received between half and three quarters of farm income from livestock, and only 10% received less than 25% from livestock (Figure 2.3).

2.3 Land distribution and usage

- Respondents were asked to indicate if the majority of their soil was clay/loam, sandy/ gravelly, dune sand, saline or some other specified type. Clay loam was the most frequently indicated soil texture (70.8%, Table 2.2), followed by sandy/gravelly (23.1%). A number of respondents indicated more than one texture type.

- Approximately one-third of respondents operated a total land base of less than 1,000 acres (Figure 2.4). Another third operated between 1,000 and 2,000 acres, and another third over 2,000 acres. Of these, nineteen respondents operated over 5,000 acres.

Table 2.2: Soil Texture of Respondents' Pastures

Soil Texture	Number of Respondents	Percent of Total[1]
Clay/Loam	233	70.8%
Sandy/gravelly	76	23.1%
Dune Sand	9	2.7%
Saline	33	10.0%
Other	37	11.2%
Totals	329	

[1]Percent does not add to 100; many respondents indicated more than one soil texture on their pastures.

Table 2.3: Respondents with Native and Seeded Pasture

Respondents that Gave:	Number of Respondents	Percent of Total
Total Pasture Acreage	328	
Some Native Pasture	300	91.5%
Some Seeded Pasture	275	83.8%
No. of above with all native	53	16.2%
No of above with all seeded	28	8.5%

Table 2.4: Respondents' Pasture Improvement Practices

Improvement Practice	Number Resp.	Number Practicing	Percent Practicing	No. of Years Between Treatment - % of Resp.				
				No. Resp.	% 1	% 2	% 3	% > 3
Pasture Reseeding	311	169	54.3	157	1.3	3.8	7.6	87.3
Fertilization	309	157	50.8	145	34.5	31.0	12.4	22.1
Chemical Control	276	93	33.7	89	19.1	15.7	21.3	43.8
Mechanical Control	288	130	45.1	121	30.6	18.2	10.7	40.5

- Almost half of respondents operated 500 acres of pasture land or less. Twenty five percent of respondents pastured from 501 to 1,000 acres and another 25% from 1,001 to 5,000 acres. There were also thirteen who operated more than 5,000 acres of pasture.

- Of the 328 respondents who gave pasture acreage, there were 300 with some native pasture (91.5%) and 275 with some seeded pasture (84.0%; Table 2.3).

- A third of the respondents had only 1 to 25% of their total pasture seeded, 27% had from 26 to 50%, 18% had 51 to 75%, and 22% had over 75% of their pasture seeded. There were 28 respondents (8.5%) with all seeded pastures and 53 respondents (16.2%) with all native pasture (Table 2.3).

2.4 Pasture improvement methods

- Of the respondents to questions about pasture management, 54.3% indicated they reseeded pastures (Table 2.4). Most of these had more than 3 years between reseeding (87.3%).

- Fifty percent of respondents fertilized their pasture (other than manure), with approximately one third of these fertilizing annually and another third every two years. The remaining respondents fertilized every third or more year.

- One third of respondents used chemical weed and brush control while 45.1% of respondents used mechanical control. There was over 3 years between weed control treatments for over 40% of respondents for both the chemical and mechanical control methods.

- There were other pasture improvement methods reported. A list of these and the seed mixtures used for reseeding are given in the companion document *Answers to Open-ended Sections of Survey Questions*.

Pasture improvement practices were compared between respondents with certain criteria as given below. Numbers in brackets indicate the percent of respondents that follow the practice.

- From Table 2.5, respondents with all seeded pasture practiced pasture reseeding (66%), fertilization (74%) and chemical (40%) and mechanical (43%) weed/brush control considerably more than respondents with all native pasture (11%, 11%, 18% and 34%, respectively).

- Respondents who indicated they use mainly rotational grazing on their pastures practiced more pasture reseeding (53%) and fertilization (50%) than those who indicated they use mainly continuous grazing (36% and 31%, respectively). Weed and brush control usage was only slightly higher for rotation grazers.

Table 2.5: Pasture Improvement Activities for Respondents Matching Various Criteria

100% of Rotation Pasture as either:	**Seeded**		**Native**	
Number of Respondents	35		44	
Pasture Improvements Methods:	# Practicing	Percent	# Practicing	Percent
Pasture Reseeding	23	65.7%	5	11.4%
Pasture Fertilization	26	74.3%	5	11.4%
Chemical Weed/Brush Control	14	40.0%	8	18.2%
Mechanical Weed/Brush Control	15	42.9%	15	34.1%
Pasture Grazing System is Mainly:	**Rotational grazing**		**Continuous Grazing**	
Number of Respondents[1]	270		70	
Pasture Improvements Methods:	# Practicing	Percent	# Practicing	Percent
Pasture Reseeding	143	53.0%	25	35.7%
Pasture Fertilization	135	50.0%	22	31.4%
Chemical Weed/Brush Control	75	27.8%	17	24.3%
Mechanical Weed/Brush Control	106	39.3%	23	32.9%
Soil Texture Includes:	**Clay/Loam[2]**		**No Clay/Loam**	
Number of Respondents	233		96	
Pasture Improvements Methods:	# Practicing	Percent	# Practicing	Percent
Pasture Reseeding	121	51.9%	41	42.7%
Pasture Fertilization	114	48.9%	37	38.5%
Chemical Weed/Brush Control	61	26.2%	29	30.2%
Mechanical Weed/Brush Control	91	39.1%	36	37.5%

[1]Five respondents that indicated their main grazing system was both rotation and continuous are not included here.
[2]Those with clay/loam soil texture could also have another type of soil texture.

- Respondents indicating a clay/loam soil texture made slightly greater use of most pasture improvement methods than those without clay/loam. Of the soil textures given, clay/loam would be considered to be the most productive.

3 Current Grazing Program

3.1 Respondents and distribution of rotational grazers experience

Of the respondents, 270 stated rotational grazing best described their grazing program and 70 stated continuous grazing best described their program. Of the continuous grazers, 33 indicated they did practice some rotational grazing. There were also 5 respondents that indicated both continuous and rotational grazing best described their grazing program.

These numbers cannot be used to indicate any trends of proportionate use of rotational grazing versus continuous grazing on the prairies, as the survey sample was a targeted group known to use pasture management or riparian area management and is not representative of all livestock producers.

- Approximately one third of rotation grazers (31%) have been using their current program from one to five years, and 29% from 6 to 10 years (Figure 3.1).

- Nineteen percent of respondents that indicated use of rotational grazing have been doing so for 11 to 15 years, and 21% for over 15 years. Two producers reported over 45 years of experience.

- Thus close to two thirds of the respondents are relatively new to rotational grazing, with 10 years of experience or less.

3.2 Characterization of rotational systems

Producers were asked a number of questions to describe their rotation system resources and grazing program.

- Just over half of the respondents had rotation system resources of 500 acres or less (Figure 3.2). Close to 20% of systems were 501 to 1,000 acres and another 23.2% were 1,001 to 5,000 acres. Rotation system acreage included seeded pasture, native pasture and any hayland producers considered as part of their rotational grazing system. Many producers put livestock on hayland at some point during the grazing season.

- Respondents were asked whether they rotated livestock from one pasture to another or if they divided pastures into a number of paddocks. Thirty six percent described their rotation system as pasture to pasture, 32% as paddock to paddock, and 32% as a combination of pastures and paddocks.

- One rotational grazing system was used by 60.7% of respondents, with all pastures and/or paddocks operated as one system; the remainder indicated they made use of more than one system.

3.3 Livestock access to forage, and supplemental feeding and grazing

There was considerable variation amongst times grazed per season for both seeded and native pastures.

- Seeded pastures were grazed over more times than native pastures (Figures 3.3 and 3.4). The greatest proportion of respondents grazed over native pastures two times over the pasture season (38% respondents), followed by 3 times (23% of respondents) and then one time (16% of respondents). For seeded pastures, the greatest proportion of respondents made 3 passes of the pasture (28%), followed by 2 passes (26% of respondents) and then 4 passes (13% of respondents). Only 6% of respondents grazed seeded pastures only once.

- Almost half of seeded pastures were grazed from 3 to 5 times compared to 35% of native pastures.

- The "other" category, which comprised a substantial proportion for both native and seeded pastures (11.4% and 19.6%, respectively), consisted of a few using more than 5 passes but was mainly those indicating use of a range of passes. Producers make decisions on the number of times to graze their various pastures or paddocks based on a number of factors, including forage quality, livestock needs, suitability of the forage for hay, and weather conditions. Thus, some pastures or paddocks may be grazed over more than others based on these factors.

- Of the 30 respondents that indicated using either more than five passes or a range of passes for native pasture in the "other" category, the most frequently cited range was 1 to 2 times (13 respondents), followed by 1 to 3 passes (4 respondents) and 2 to 3 passes (3 respondents). There were also 3 respondents that indicated using 6 passes.

- Of the 51 respondents for seeded pasture in the "other" category, there were 11 respondents for each of 1 to 2 passes and 2 to 3 passes, and 7 respondents citing 1 to 3 passes. There were also 2 respondents using 6 passes, one using 10 passes and one using 14 passes of seeded pasture. In both native and seeded pastures there were a number of other ranges cited, varying between 1 and 5 passes.

Respondents were also asked to indicate how they determine the time spent in each paddock or pasture:

- When asked how they time the number of days livestock are kept in each paddock or pasture, 25% indicated by a certain number of days, 66.2% by forage height, 40.7% by percent of pasture utilized and 16.9% by some other method. Approximately half of the respondents indicated using more than one method.

- The greatest proportion of respondents (59%) who used forage height, moved cattle after the forage had been grazed to between 2.6 to 5.0 inches (Figure 3.5).

- Of the respondents who used percent utilization of pastures as an indicator of when to move cattle, approximately half were in the 51 to 75% utilization range, 20% in the 26 to 50% range, and 25% in the 76 to 100% range (Figure 3.6).

Both stubble and hayland were sources of additional grazing for producers. Supplemental feeding on pasture was not a widely used practice.

- Almost half of respondents grazed stubble yearly and, similarly, about half grazed hayland yearly (Figures 3.5 and 3.6). The remaining respondents were split fairly evenly between occasionally or never using stubble or hayland grazing.

- Almost 20% of respondents provided supplemental feed to calves and stockers on pasture. Just over 10% of producers provided supplemental feed to the other categories of grazing livestock.

4 Livestock Production on Rotational Grazing System

4.1 Characterization of livestock on rotation system

Respondents were asked to indicate the livestock kept on their rotation system and their usage of the rotation pastures.

- Of 295 respondents, 282 indicated their operation was mainly a beef cattle enterprise, four a dairy enterprise and 22 some other livestock enterprise, primarily horse or sheep. Several respondents indicated more than one livestock type as their primary livestock enterprise .

- Of the 282 beef enterprises, 274 indicated they had cow/calf operations and, of these, 226 appeared to be primarily cow/calf operations.[4] Thus, of the 295 respondents giving animal numbers, 77% were primarily cow/calf operators. For all three provinces, a high proportion of the respondents giving animal numbers were primarily cow/calf operators (73% for Manitoba, 86% for Saskatchewan, and 73% for Alberta).

- Size distribution of grazing operations based on number of beef animals reported by 278 respondents that had primarily beef cattle, shows that just over half of respondents grazed 100 head or less, 28% grazed from 101 to 200 head, 12% had between 201 and 300 head, and, of the remainder, 11 respondents had between 301 and 500 head, and 13 had over 500 head (Figure 4.1). While all sizes of operations are represented in the survey, 80% of respondents were grazing 200 head of cattle or less.

4.2 Grazing season length and intensity for beef animals on rotational systems

- The length of grazing season on their rotation system was analyzed for respondents with cow/calf pairs. The majority of respondents, 56%, had livestock on their rotation system for 4.1 to 6

[4]Enterprises were considered mainly cow/calf on the basis of having accompanying replacement stock of less than 50% of the number of cow/calf units and/or stockers numbering less than 25% of the number of cow/calf units, and/or other livestock species numbering less than 25% of the number of cow/calf units.

months (Figure 4.2). Twenty percent rotational grazed from 2 to 4 months, 16% grazed from 6.1 to 8 months, 8% grazed more than 8 months, and less than 1% grazed less than 2 months.

- In terms of animals grazed per acre, 275 respondents with mainly beef enterprises indicated that 68% of them grazed less than 0.26 animals per acre, and 22% grazed from 0.26 to 0.50 animals per acre (Figure 4.3). Only 2 respondents reported over one animal per acre, both of these were from Alberta.

4.3 Stocking rates by AUM/acre

The stocking rate obtained by respondents' grazing programs are expressed in animal unit months per acre (AUM/acre). A description of how AUM/acre was calculated is given in the Appendix. As explained in the Appendix, the calculations of stocking rates are based on the total animals each respondent has on their rotation system and are calculated as a whole for the rotation system. This gives some idea of the utilization of the entire rotation system resource but does not give a complete picture of each respondent's usage and stocking pressure on the various components of their rotation system.

- Rotation grazers fell mainly into one of two categories for stocking rates. From 213 respondents that provided all the information required to calculate stocking rates, 40% had less than 1.0 AUM/acre and 39% between 1.0 and 1.9 AUM/acre (Figure 4.4). Fourteen percent of calculated stocking rates were between 2.0 and 2.9 AUM/acre. Above that, 11 respondents' stocking rates were between 3.0 and 3.9 AUM/acre and three between 4.0 and 6.5 AUM/acre.

- Comparing the three provinces, Saskatchewan had the lowest stocking rates (71% with less than 1.0 AUM/acre and 27% with 1.0 to 1.9 AUM/acre) and Alberta had the highest (22% with less than 1.0 AUM/acre, 38% with 1.0 to 1.9 AUM/acre and 28% with 2.0 to 2.9 AUM/acre). Manitoba's stocking rate was similar to the overall prairie response, with 36% of respondents with less than 1.0 AUM/acre and 47% with 1.0 to 1.9 AUM/acre.

- Stocking rate for respondents with mainly cow/calf operations were also calculated. These had almost exactly the same distribution as for all livestock and therefore are not illustrated.

4.4 Weight gain for beef animals

Weight gains for beef on rotational grazing systems were evaluated on the basis of total pounds of calf gain per acre for each respondent. Total pounds of calf gain per acre was calculated by multiplying the respondent's number of calves on pasture by the given average calf weight gain on pasture and dividing this by the acreage of the rotation system. Estimates came from 200 respondents considered to be mainly cow/calf operations.

- Close to half (47%) of the 200 respondents had pounds of calf gain per acre in the 31 to 75 pound range (Figure 4.5).

- Close to one quarter of respondents had calf weight gains in the 76 to 150 pound/acre range and 20% in the 5 to 30 pound/acre range.

- Close to 10% of respondents had calf gains of over 150 to 300 pound per acre.

- Comparing the three prairie provinces, again Saskatchewan had slightly lower calf gain/acre, with 28% of respondents in the 5 to 30 pound per acre range, 56% in the 31 to 75 pound per acre range, 16% in the 76 to 150 pound per acre range, and none above 150 pounds per acre. Alberta had fewer respondents in the lower weight gain category and more in the higher weight gain categories, with 12% of respondents in the 5 to 30 pound/acre range, 30% in the 31 to 75 pound per acre range, 37% in the 76 to 150 pound per acre range, and 20% in the 151 to 300 pound per acre range. Manitoba's calf gain per acre distribution was very similar to the overall prairie response.

4.5 Intensity of pasture management, and stocking rates and weight gains

It was of interest to look at whether respondents with more intensively managed pastures had stocking rates or weight gains that differed from respondents with less intensively managed pastures. Intensity of pasture management is determined here by the amount of labor, time and planning that would be required in terms of moving livestock around and planning rotation strategies.

Categorizing a respondent as utilizing either a more or less intensively managed pasture system is a somewhat arbitrary decision in terms of where one makes the cutoff for placing a respondent in the more intensive or less intensive management system. Such decisions will vary depending on what one considers as an intensive management system.

For the purposes of this study, respondents were initially considered to be intensively managing their pastures if they had six or more pastures or paddocks, with an average pasture/paddock size of 100 acres or less, and if their livestock made 3 or more passes of the pasture over the grazing season. It was then noted, however, that there were a number of respondents that made less than 3 passes of their pasture but had a high number of pastures or paddocks. This was particularly true for Alberta; for example, one respondent from Alberta made only two passes of his seeded pasture, but had 420 acres of seeded pasture divided into 20 paddocks. Therefore, the criteria was changed to also include, as well as the previous criteria, respondents with more than 10 pastures or paddocks, with an average pasture/paddock size of 100 acres or less and with livestock making at least more than one pass of the pasture. Results are given in Figures 4.6 to 4.9.

- Stocking rates on pastures considered intensively managed were higher than on the less intensively managed pastures. For the intensively managed pastures, 20% of respondents were in the less than 1.0 AUM/acre, compared to 52% of respondents with less intensively managed pastures (Figures 4.6 and 4.8).

- Fifty-three percent of respondents with intensively managed pastures had stocking rates in the 1.0 to 1.9 AUM/acre range and 26% had stocking rates of 2.0 AUM/acre and over.

- In comparison, 32% of respondents with less intensively managed pastures had stocking rates in the 1.0 to 1.9 AUM/acre range and 16% had stocking rates of 2.0 AUM/acre and over.

- For calf gains per acre (Figures 4.7 and 4.9), while both groups had the majority of their respondents in the 31 to 75 pound per acre range (51% for the intensively managed group and 46% for the less intensively managed group), the more intensively managed pastures had more respondents gaining over 75 pounds per acre (40%) compared to the less intensive group (31%).

5 Comparison With Pasture Under Previous Management System

5.1 Characterization of respondents' previous systems

Respondents were asked if their rotation pastures had ever been operated under a grazing management system that differed from their current system.

- Of the 302 respondents, 177, or 58.6%, had used a different management system and 125 respondents, or 41.3%, had not used a different management system.

- Of those that had used a different system, 88% had used a continuous grazing system and 12% had used a different type of rotational grazing system.

- The number of years respondents' rotation pastures were under a different management system are given in Figure 5.1. Respondents were fairly equally distributed between four ranges (19% were in the 1 to 10 year range, 23% in the 11 to 20 year range, 21% in the 21 to 30 year range and 24% in the 31 to 50 year range). There were also 13% of respondents that had operated under a previous system for over 50 years.

- There were more respondents with total pasture acreage in the less than 501 acres range under their previous management system (62% compared to 46% total pasture acreage under their current system; see Figures 5.2 and 2.5) and fewer with over 1,000 acres (18% compared to 28%). The percent of respondents in the 501 to 1,000 acre range was very similar in both cases. Respondents appeared to have increased their total pasture resources with rotational grazing.

5.2 Stocking rates and weight gains under the previous system

Comparing stocking rates and calf weight gains for respondents with a previous system to that of the aggregate whole of the current system distributions as given in Figures 4.4 and 4.5, shows a similar distribution of respondents in the various categories, with the previous system showing only a slightly larger proportion of respondents in the lower stocking rate and weight gain categories.

- The distribution for respondents' stocking rates under their previous management system was similar to that of the current rotational grazing system (compare Figure 5.3 to Figure 4.4), with 44% of respondents falling in the less than 1.0 AUM/acre range and 44% in the 1.0 to 1.9 AUM/acre range, compared to 40% and 39%, respectively, for the current system.

- For total calf weight gain per acre, the distribution was again similar to the current system. Under the previous system there were 27% of respondents in the 8 to 30 pound per acre range, compared to 20% in the 5 to 30 pound per acre range for the current system (Figures 5.4 and 4.5). The proportion of respondents in the 31 to 75 pound range, at 48% for the previous system, was almost the same as for the current system. Twenty-five percent of respondents had over 75 pounds of gain per acre for the previous system compared to 33% under the current system.

5.3 Respondents' observations of change

Producers were asked to identify changes in practices, productivity, costs and returns that have been observed as they moved from their previous pasture management system to the system they are presently following. They were asked to compare specific attributes and indicate whether 1999 was no different, lower or greater than the last year of their previous system. If there was a difference they were also asked to estimate the percent difference, given a range of percentages from which to choose. Of the 177 producers that indicated they had a previous management system, 161 respondents, or 91%, answered some or all of the questions on these changes.

Table 5.1 gives each of the attributes measured, as well as the number of respondents for each and the percent of respondents that found 1999 was either no different, greater or lower than the last year of their previous system. For those questions that the greatest proportion of respondents reported a difference between 1999 and their previous system, the percent difference is illustrated in Figures 5.5 to 5.13. The number of respondents that indicated direction of change for their current system is not always the same as the number for percent change, as some respondents that indicated direction did not always indicate the percent change; these are indicated in the figures as 'no % response given.'

Table 5.1: Comparison of 1999 to Last Year of Previous Pasture Management System

Attribute Measured:	No. of Resp.	% that found 1999 was: No Different	Greater	Lower
Average weight gain on pasture/animal	149	16.8	80.5	2.7
Pasture forage production quantity	160	6.3	91.3	2.5
Pasture forage production quality	154	9.7	87.7	2.6
Herd health cost/animal	158	60.8	8.9	30.4
Amount of pasture reseeding	158	59.5	20.3	20.3
Amount of pasture fertilization	159	62.9	27.0	10.1
Amount of weed/brush control	159	66.0	21.4	12.6
Amount of supplemental feeding	159	67.9	10.1	22.0
Amount of stubble grazing	152	67.1	13.2	19.7
Amount of hayland grazing	149	60.4	23.5	16.1
Time spent on planning and management	161	10.6	85.7	3.7
Labor requirements	161	12.4	82.6	5.0
Overwintering costs	158	43.7	3.2	53.2
1999 Overall costs per animal	158	24.1	24.1	51.9
1999 Overall net returns/animal	155	12.9	84.5	2.6
1999 Overall net returns for operation	148	10.1	88.5	1.4

Respondents were asked thirteen questions about changes they observed in areas affecting costs or returns to their enterprise.

- Eighty percent of respondents indicated their livestock average weight gain on pasture was greater under their current system, 16.8% indicated there was no difference and only 2.7% indicated it was lower (Table 5.1). The greatest proportion of respondents (45.6%) indicated their change in 1999 was 1 to 10% greater (Figure 5.5).

- Pasture forage production quantity was believed to be greater in 1999 compared to the last year of their previous system by 91.3% of respondents. The greatest proportion of respondents (39%) reported the change was 15 to 25% greater in 1999, and there were equal proportions, close to 21%, in the 1 to 10% range and the 26 to 50% range (Figure 5.6).

- Similarly, pasture forage production quality was believed to be greater in 1999 by 88% of respondents, with 32% indicating a percentage increase of 15 to 25% and close to 22% of respondents in both the 1 to 10% range and 26 to 50% range (Figure 5.7).

- The greater proportion of respondents reported no change to herd health costs, pasture re-seeding, fertilizer use on pasture, weed/brush control, supplemental feeding and hayland and stubble grazing. However, those that did observe changes in these areas showed a pattern of lower herd health costs (31 respondents indicating lower costs in the 1 to 10% range), more of each of fertilizing (23 respondents in the 1 to 25% greater range), weed control (16 respondents in the 1 to 10% greater range), and hayland grazing (15 respondents in the 1 to 10% greater range), and less supplemental feeding and stubble grazing.

- There was also a requirement for more time spent on planning and management of the rotation system, with 86% of respondents indicating an increase in this area. About one quarter of respondents were in each of the 1 to 10% greater and 15 to 25% greater ranges, with the 26 to 50% greater and over 50% greater ranges also having appreciable numbers (Figure 5.8).

- Labor requirements were also higher for the rotation system, with 83% indicating greater labor requirements, 12% indicating no change and 5% indicating lower labor requirements. Twenty-nine percent of respondents indicated their labor requirements in 1999 were in the 1 to 10% greater range and 29% in the 15 to 25% greater range (Figure 5.9).

- Overwintering costs per animal were reported to be mainly lower (53% of respondents) or no different (44% of respondents). Close to 20 percent of respondents indicated overwintering costs had decreased by 1 to 10% and another 20 percent by 15 to 25% (Figure 5.10).

Respondents were also asked direct questions on the impact of their current system on overall costs per animal, net return per animal and net returns for their whole livestock operation, in comparison to their previous system.

- Half of these respondents believed their overall production costs per animal were lower under the current system (Table 5.1). One quarter indicated these costs were no different and one quarter indicated they were higher. Of the respondents, 26% indicated costs were lower in 1999 by 1 to 10%, compared to the last year of their previous system, and 16% of respondents indicated costs were lower by 15 to 25% (Figure 5.11).

- Eighty-four percent of respondents indicated net return per animal was greater in 1999 and 13% indicated there was no difference. Of total respondents, 42% believed the increase was from 1 to 10% and 29% by 15 to 25% (Figure 5.12). Only 4 respondents observed lower returns from their new system, 3 of them stating from 1 to 10%, and 1 stating 15 to 25%.

- When asked about net returns for the whole operation, 88% indicated they were greater in 1999 and 10% indicated there was no difference. Again, 41% indicated the increase was in the 1 to 10% range, and 32% estimated from 15 to 25% (Figure 5.13). The one respondent who indicated the net return to the operation was lower, was from an area of Manitoba that had experienced flooding in 1999 and had indicated pasture and livestock production were below average in 1999.

In general, these comparisons between respondents' current pasture management systems and their previous systems show that producers perceived economic benefits from switching to their current systems. Improved forage and improved herd health and productivity are factors contributing to these recognized gains. The added costs of time spent on planning, management and labor would appear to have a payoff in these areas.

Several qualifications need to be made here regarding these comparisons between producers' current and previous systems. First, some benefits have to be attributed to the fact that producers rated 1999 as a year when both pasture and livestock productivity were for the most part average to above average (livestock productivity in 1999 rated as above average by 42% of respondents and as average by 50%; pasture productivity rated as above average by 58% of respondents and as average by 28%), while in the last year of producers' previous system, conditions for both were mostly average (livestock productivity rated as average by 80% of respondents and pasture productivity rated as average by 71%).

Also, producers were asked to rate the differences in economic returns for the operation for 1999 and the last year of their previous system as an overall comparison, and were not asked to take into account, for example, inflation, or differences in prices. Changes to productivity or profitability between one year and another would be the result of a number of contributing factors. Cattle prices were high in 1999 and feed prices were low, which would contribute to higher net returns. Also, some producers may have made changes to their herd genetics or herd health program. However, given the high proportion of producers that indicated greater animal weight gain on pasture, and greater forage production and quality for their current system, coupled with their reasons for these improvements, as will be discussed in the next section, this indicates the producers perceive that changes made to their grazing program have contributed to these indicated gains. Separating out the relative impacts of price, inflation, and management would require a more detailed, indepth level of study, particularly since the last year of their previous system will vary by producer.

5.4 Respondents' rating of reasons for improvement

Respondents were asked to rate a number of factors for their importance in contributing to on pasture livestock weight gains or stocking gains, as well as the importance of factors contributing to pasture forage improvements. Figures 5.14 and 5.15 illustrate the distribution of ratings for each attribute, while Table 5.2 gives the number of responses for each attribute measured, and the percent of respondents that rated each as important to very important, neutral, or not important to not at all important.

- For factors contributing to livestock production gains, the majority of respondents gave important to very important ratings to greater forage quantity (88% of respondents),

Table 5.2: Respondents' Rating of Various Factors Associated with Livestock and Forage Production Gains

Factor Rated:	Number Indicating				Percent of Total		
	Important	Neutral	Not Important	Total Resp.	Important	Neutral	Not Important
Importance of factors contributing to livestock weight or stocking gains							
Clean drinking water	108	36	24	168	64.3%	21.4%	14.3%
Forage quantity	150	17	4	171	87.7%	9.9%	2.3%
Forage quality	150	16	5	171	87.7%	9.4%	2.9%
Utilization of forage	144	18	7	169	85.2%	10.7%	4.1%
Decreased foot-rot	59	41	63	163	36.2%	25.2%	38.7%
Improved breeding stock	93	32	37	162	57.4%	19.8%	22.8%
Improved herd health program	70	53	40	163	42.9%	32.5%	24.5%
Importance of factors contributing to forage improvements							
Rotational grazing	168	5	1	174	96.6%	2.9%	0.6%
Improved fertilization program	39	34	86	159	24.5%	21.4%	54.1%
Improved weed/brush control program	43	33	85	161	26.7%	20.5%	52.8%
Improved forage species/varieties	80	37	47	164	48.8%	22.6%	28.7%
More reseeding	21	26	107	154	13.6%	16.9%	69.5%

improved forage quality (88%), improved utilization of available forage (85%) and better access to clean drinking water (64%; Figure 5.14 and Table 5.2).

- There were also 57% of respondents that indicated that improvements they have made to their breeding stock have also made important contributions to livestock production gains, and 43% indicated that improvements made to their herd health program were also important factors.

- When asked for the importance of reasons why forage production had improved, respondents gave practically all the credit to the rest and grazing patterns of rotational grazing, with 97% of respondents rating this factor as important to very important (Figure 5.15). Improved fertilization, weed control, or more reseeding were generally considered neutral factors or not important to the respondents' situations. Introduction of improved forage species was rated as important to very important by 49% of respondents, while 23% were neutral to this factor and 29% rated it as not important.

6 Pasture Water Resources and Management

Conservation organizations are interested in gaining more information on water sources for livestock, the types and amounts of surface water bodies producers have on their pastures, and how producers utilize these water bodies, including the access livestock are given to surface water sources.

6.1 Livestock access to drinking water

One aspect of livestock water supply that is of interest is the spacing of water sources on pasture. When livestock have to travel a long distance from one part of the pasture to their water supply they tend to overgraze the pasture near the water supply while other parts are undergrazed.

- Figures 6.1 and 6.2 give maximum distance to water for pastures where there is no division into paddocks and for paddocks, respectively. Livestock generally had less distance to travel to water on paddocks, with 41% of respondent in the 0.25 miles or less category, compared to 25% of respondents for pastures. The proportion of respondents in the 0.26 to 0.50 mile range was similar for both pastures and paddocks (46% and 41%, respectively), while 30% and 18% of respondents, respectively, indicated livestock had to travel over half a mile to water on pastures and paddocks.

- Almost half (49%) of 301 respondents indicated their livestocks' average distance to drinking water was a quarter of a mile or less, while another 42% said their average distance was between a quarter and half a mile (Figure 6.3).

6.2 Types, distribution, and extent of surface water

There were 344 respondents that reported on surface water bodies on their pastures.

- 162 respondents (47%) indicated they had rivers, creeks or streams flowing through their pastures. Half of the respondents who reported the miles of flowing water, reported 1.25 miles or less (Figure 6.4). Only 20% reported more than 2.5 miles of flowing water in their pastures. Seventy-six percent of respondents indicated this water source was sufficient for watering livestock for the entire season and 24% indicated the water source was only temporary.

- 226 respondents (66%) reported having sloughs, lakes or ponds on pasture. Almost two thirds of these had 20 acres or less of such water (Figure 6.5). Sixty-one percent of respondents indicated the water source was sufficient for the pasture season and 39% indicated it was temporary.

- 286 respondents (83%) had dugouts on their pastures and the larger proportion of these (61%) had from one to three dugouts on pasture, while 27% had 4 to 6 dugouts (Figure 6.6). Ninety-one percent of respondents indicated this water source was sufficient for the pasture season.

- Of 288 respondents, 86% indicated they took no other types of bank erosion control for their surface water bodies other than fencing. The types of erosion control taken by the 14% that indicated they used some other methods are listed in the companion document *Answers to Open-ended Sections of Survey Questions*.

- Of 298 respondents, 66% indicated they did not and 34% indicated they did transport water from their on pasture water bodies for their livestock use in 1999.

- A number of producers also made comments that they had springs on their pastures which they used as a source of water supply for their livestock

6.3 Livestock access to land adjacent to water

Fifty percent of respondents (162 of 323 respondents) indicated they fenced off some of their surface water bodies.

- The majority of respondents had 20 acres or less of adjacent land fenced off (72% of the 144 respondents that indicated the amount of land fenced; Figure 6.7). There were 16 respondents with over 100 acres of land fenced off.

- Of the 156 respondents that indicated the access livestock had to this fenced area, the highest proportion (83 respondents or 53%) gave no access to this fenced off area, while 62 respondents (40%) gave restricted access and only 20 respondents (13%) gave free access (Figure 6.8; percentages cannot be added to 100 because some respondents indicated they allowed more than one access type to different fenced off areas.)

- Of 140 respondents, 46% indicated that livestock have had restricted or no access to the fenced off areas for less than 5 years and 31% for 5 to 9 years (Figure 6.9).

- Half of producers (from 140 respondents) indicated they allowed periodic grazing on the fenced off area. Of the 40 that indicated when they allowed grazing, 20 indicated in the fall or fall/winter period, 15 in the summer/late summer period, one in the spring, and four early and then late in the season. One third of respondents allowed livestock to graze for less than 5 days, 15% for 5 to 9 days, 26% for 10 to 19 days and 26% for 20 or more days (Figure 6.10).

6.4 Impact of riparian management on the livestock operation

Management of riparian areas on pastures is considered to provide benefits to fish and wildlife habitat, as well as to the overall sustainability of the water resource. There is little information available, however, on how this impacts the livestock operation itself. This study does not make any attempts to make direct measurements of the contribution of riparian management to the livestock operation. Some comparisons can be made, however, by determining if perceptions of producers with managed access to riparian areas have a similar distribution as respondents that do not manage riparian area access. The comparisons made were for several of the attributes given in Table 5.1, for which respondents were asked to make comparisons between 1999 and the last year of their previous system. The attributes of interest are:

- time spent on planning and management,
- labor requirements, and

- overall net returns for the livestock operation.

Because the comparison is made between 1999 and the last year of their previous system, it is limited to respondents that rotation graze and that had a previous system by which to compare, as was the case for the aforementioned table. Also, since respondents were not asked to make these comparisons for their current system to their previous system based on changes made specifically to management of their riparian areas, but rather on changes to their overall grazing program, these comparisons are not a case of when respondents were riparian managing versus when they were not. What the below comparisons tell us is whether there are any noticeably different trends between respondents that do and do not manage their riparian areas.

For the purposes of this discussion, based on the data that is available from the survey, respondents that riparian manage are defined as those that have indicated they fence their surface water bodies and allow livestock either no access or only restricted access to the fenced off area. Respondents that do not riparian manage are defined as those that have indicated they do not fence off any of their surface water bodies, or if they do have fencing they still allow livestock free access to the fenced off areas.

A third subset of respondents is also examined here, and which is itself a more restricted version of the riparian subset. This third subset includes only those producers that allow livestock no access to the fenced off riparian area. As some producers indicated several types of access (e.g. they may have had one fenced off area to which the livestock are given restricted access and another to which the livestock are given no access), this third subset includes only those respondents that give no access to any of the fenced off riparian areas around their surface water bodies. What this indicates is that these producers are using an alternate means of providing water to their livestock. This could include water transported from the surface water body by some means, for example, through the use of solar pumps. The producers could also have an access site to the surface water body which is not part of the fenced off area. Or the producers could be using some alternate water source. As the survey was concerned mainly with the management of the riparian areas, and due to the length and detail of the survey, no questions were asked on alternate water sources. Producers that give their livestock either free or restricted access to surface water bodies may be also be transporting water from these water bodies, as well as may be using alternate water sources.

The results of this comparison for the three subsets are given in Table 6.1.

- There were 136 respondents that riparian manage, and of this 136, there were 87 respondents that rotation graze and had indicated use of a previous grazing system. Table 6.1 refers to the latter 87 respondents.

- There were also 180 respondents that did not manage their riparian areas, and of this 180, there were 81 respondents that rotation graze and had indicated use of a previous system. Again, Table 6.1 refers to the latter 81 respondents.

Table 6.1: Comparison of 1999 to Last Year of Previous Management System, for Respondents that Do and Do Not Riparian Manage and Respondents that Give Livestock No Access to Fenced Area

Attribute Measured:	No. of Resp.	% that found 1999 was: No Different	Greater	Lower
Respondents that Riparian Manage				
Time spent on planning and management	82	9.8%	85.4%	4.9%
Labor requirements	83	9.6%	85.5%	4.8%
1999 Overall net returns for operation	73	4.1%	93.2%	2.7%
Respondents that Give Livestock No Access to Fenced Area[1]				
Time spent on planning and management	49	6.1%	89.8%	4.1%
Labor requirements	49	8.2%	85.7%	6.1%
1999 Overall net returns for operation	42	4.8%	90.5%	4.8%
Respondents that do not Riparian Manage				
Time spent on planning and management	72	11.1%	86.1%	2.8%
Labor requirements	71	16.9%	77.5%	5.6%
1999 Overall net returns for operation	70	17.1%	82.9%	0.0%

[1]Respondents that give livestock no access to fenced area are also included in the above subset of respondents that riparian manage.

- The distribution for time spent on planning and management, indicating whether 1999 was no different, greater or lower than the last year of their previous system, was very similar for the three subsets examined here, with all three having between 85 - 90% of respondents indicating 1999 was greater for time spent on planning and management.

- A slightly greater proportion of the respondents that riparian manage indicated that labor requirements were greater for their current system in 1999 compared to their previous system; 86% of respondents in this groups compared to 78% of respondents that do not riparian manage. The proportion of these two groups that indicated labor requirements were no different for their current system, was 10% and 17%, respectively.

- Ninety-three percent of respondents that riparian manage indicated their overall net returns for their livestock operation were greater for their current system (1999), compared to 83% of the respondents that do not riparian manage; 4% of the former and 17% of the latter indicated that net returns were no different between 1999 and the last year of their previous system.

- From Table 6.1, the respondents that allow livestock no access to the fenced area have distributions for all three attributes that are similar to the overall group that riparian manages.

Thus, riparian managing did not appear to appreciably add to extra requirements for planning and management time, plus only a slightly larger proportion of this group indicated they experienced greater labor requirements for their current system compared to their previous system. Riparian management also did not reduce the proportion of respondents that experienced an increase in net returns from the livestock operation under the new system.

7 Characterization of Current Pasture Management Program

7.1 Reasons to use rotational grazing system and restrict livestock access to water

Respondents were asked to rate reasons for using rotational grazing and for giving livestock either restricted or no access to a surface water body, plus they were asked to indicate their observations since these changes were made. Again, these results are illustrated in Figures 7.1 to 7.3, with the numbers and percentages given in Table 7.1.

- When respondents rated reasons for using a rotational grazing system, most respondents felt it was important to very important for improving pasture condition (96%), improving the long-term sustainability of the land base (92% of respondents), increasing stocking rate (82%), and increasing annual income (80%; Table 7.1 and Figure 7.1). Interestingly, more producers rated improving pasture condition and sustainability as important than to increase annual income. A lower proportion, 43%, rated to improve wildlife habitat as important.

- The highest proportion of respondents who rated reasons for giving livestock restricted or no access to water bodies cited to improve long-term sustainability of surface water bodies and improve water quality for livestock as important to very important reasons (87% and 86% of respondents, respectively; Table 7.1 and Figure 7.2). To reduce foot-rot disease in cattle was rated as important by 67% of respondents; to increase annual income or improve fish and wildlife habitat were each rated as important by just over half of the respondents.

7.2 Respondents' observations since changes made to pasture management system

Producers have observed numerous improvements to both production and to wildlife habitat since they made changes to their pasture management system (see Table 7.1 and Figure 7.3).

- The majority of respondents have observed improved cover for nesting waterfowl (71% of respondents), improved cover for upland game (60%), improved quality of surface water bodies (68%), and improved livestock health and condition (72%).

- Approximately half of respondents (49%) have observed a decrease in weeds and/or undesirable forages, and just over half observed an increase in desirable forages (55%).

- The majority of respondents either did not observe or were not sure of increased fish populations (52% no and 39% not sure), new bird species (27% no and 50% not sure), and new fish species (54% no and 44% not sure).

Table 7.1: Respondents' Rating of Various Attributes Pertaining to their Current Management System and Observation of Changes

Factor Rated:	**Number Indicating**				**Percent of Total**		
	Important	**Neutral**	**Not Important**	**Total Resp.**	**Important**	**Neutral**	**Not Important**
Respondents' rating of reasons for using rotational grazing							
Increase annual income	239	44	14	297	80.5%	14.8%	4.7%
Improve pasture	293	12	1	306	95.8%	3.9%	0.3%
Increase stocking rate	241	41	13	295	81.7%	13.9%	4.4%
Improve wildlife habitat	127	105	66	298	42.6%	35.2%	22.1%
Improve sustainability of land base	282	20	3	305	92.5%	6.6%	1.0%
Respondents' rating of reasons for controlling livestock access to surface water bodies							
Increase annual income	87	36	42	165	52.7%	21.8%	25.5%
Improve livestock water	152	13	11	176	86.4%	7.4%	6.3%
Reduce foot-rot disease	117	31	26	174	67.2%	17.8%	14.9%
Improve habitat	91	38	42	171	53.2%	22.2%	24.6%
Improve sustainability of water body	152	10	12	174	87.4%	5.7%	6.9%
Respondents' rating of importance of constraints to adopting rotational grazing management							
Labor requirements	207	73	50	330	62.7%	22.1%	15.2%
Management requirements	194	82	53	329	59.0%	24.9%	16.1%
Financial requirements	243	57	32	332	73.2%	17.2%	9.6%
Lack of sufficient water supply	187	43	89	319	58.6%	13.5%	27.9%
Lack of info. on establishing/mging	82	86	151	319	25.7%	27.0%	47.3%
Lack of info. on economic benefit	91	95	128	314	29.0%	30.3%	40.8%
Factor Observed:	**Number that have Observed**				**Percent of Total**		
	Yes	**No**	**Don't Know**	**Total Resp.**	**Yes**	**No**	**Don't Know**
Observations made after changes to pasture management or livestock access to water bodies							
Improved waterfowl cover	157	28	37	222	70.7%	12.6%	16.7%
Improved upland cover	133	39	50	222	59.9%	17.6%	22.5%
Increased fish populations	18	106	79	203	8.9%	52.2%	38.9%
New bird species	51	59	108	218	23.4%	27.1%	49.5%
New fish species	5	107	87	199	2.5%	53.8%	43.7%
Improved water quality	145	36	31	212	68.4%	17.0%	14.6%
Increase in desirable forages	118	41	55	214	55.1%	19.2%	25.7%
Decreased weeds/undesirable forages	105	63	48	216	48.6%	29.2%	22.2%
Improved livestock health/condition	158	27	35	220	71.8%	12.3%	15.9%

Table 7.2: Respondents' Observations after Changes to Pasture Management or Livestock Access to Water Bodies - for Respondents that Do and Do Not Riparian Manage

Factor Observed:	Number that have Observed				Percent of Total		
	Yes	No	Don't Know	Total Resp.	Yes	No	Don't Know
Respondents that Riparian Manage (fenced & no or restricted access)				**136**			
Improved waterfowl cover	102	10	19	131	77.9%	7.6%	14.5%
Improved upland cover	79	19	32	130	60.8%	14.6%	24.6%
Increased fish populations	14	57	50	121	11.6%	47.1%	41.3%
New bird species	36	31	63	130	27.7%	23.8%	48.5%
New fish species	5	61	54	120	4.2%	50.8%	45.0%
Improved water quality	100	9	19	128	78.1%	7.0%	14.8%
Increase in desirable forages	66	27	32	125	52.8%	21.6%	25.6%
Decreased weeds/undesirable forages	59	43	26	128	46.1%	33.6%	20.3%
Improved livestock health/condition	93	13	22	128	72.7%	10.2%	17.2%
Respondents that Don't Riparian Manage (no fence or have free access)				**180**			
Improved waterfowl cover	47	17	15	79	59.5%	21.5%	19.0%
Improved upland cover	46	19	14	79	58.2%	24.1%	17.7%
Increased fish populations	2	44	26	72	2.8%	61.1%	36.1%
New bird species	12	26	38	76	15.8%	34.2%	50.0%
New fish species	0	41	28	69	0.0%	59.4%	40.6%
Improved water quality	36	25	10	71	50.7%	35.2%	14.1%
Increase in desirable forages	48	12	17	77	62.3%	15.6%	22.1%
Decreased weeds/undesirable forages	43	16	17	76	56.6%	21.1%	22.4%
Improved livestock health/condition	56	12	11	79	70.9%	15.2%	13.9%

The distributions for these same observations were done for the two subsets given in section 6.4 for respondents that riparian manages (fenced off area around a surface water body and gives either restricted or no access to this fenced off area) and respondents that do not riparian manage (have a surface water body with either no fencing, or if fenced still allow livestock free access to fenced area). The percent distribution of respondents for each of these observations for these two subsets is given in Table 7.2.

- There was a greater proportion of respondents that riparian manage that noticed improved waterfowl cover, increased fish populations, new bird species and improved water quality, compared to those that don't riparian manage. The proportion of respondents, however, that noticed new bird or fish species, or increased fish populations, was, as indicated previously, very low overall.

- The proportion of respondents that noticed improved cover for upland game was very similar for both subsets of respondents, close to the 60% for respondents that do and respondents that do not riparian manage.

- Slightly more of the respondents that do not riparian manage noticed an increase in desirable forages (62% compared to 53% of respondents that riparian manage), as well as a decrease in weeds and undesirable forages (57% compared to 46% of respondents that riparian manage).

- The most noticeable difference between these two subsets was for water quality. Of those that riparian manage, 78% of respondents noticed an improvement in water quality, 7% did not and 15% were not sure. Of those respondents that do not riparian manage, 51% noticed an improvement in water quality, 35% did not and 14% were not sure.

7.3 Capital costs incurred establishing rotational systems and fencing off surface water bodies

Of 324 respondents, 241 respondents, or 74%, indicated they had incurred new capital costs to establish their rotation system or for fencing off a water body. Of this 241 respondents, 217 gave an estimate of the costs for these changes.

- Almost half of respondents incurred $5,000 or less in new capital costs, and 28% incurred between $5,000 and $10,000. Ten percent reported over $20,000 of new costs (Figure 7.4).

- Thirty-eight percent of respondents had new capital costs per acre of less than $7 per acre, 18% between $7 and $14 per acre, 23% between $15 and $29 per acre, and 21% had new capital costs of $30 per acre and over (Figure 7.5).

7.4 Planned capital and operating changes

Producers were asked to indicate any planned changes to their pasture management program and livestock operation for over the next five years (Tables 7.3 and 7.4).

- The most common planned changes to pasture management programs were for developing water supply (49% of respondents), improving seeding strategies (38%), installing fences around water (37%), improving their fertilization strategy (33%) and changing their rotation strategy (30%; Table 7.3).

- No respondents planned to switch from rotational to continuous grazing; 46 respondents (14%) planned on switching from continuous to rotational grazing.

- The largest proportion of respondents plan on expanding their operation; 66% of respondents plan on expanding their livestock herd (Table 7.4)

- Nineteen percent of respondents have no changes planned for their pasture management program and 24% have no changes planned for their livestock operation.

Table 7.3: Respondents' Planned Changes to Pasture Management Program Over Next 5 Years

Planned Change	Number	% Indicating
No changes planned	64	19.1%
Switch from continuous to rotational grazing	46	13.7%
Switch from rotational to continuous grazing	0	0.0%
Installing fences around water	123	36.7%
Removing fences around water	5	1.5%
Changing rotation strategy	99	29.6%
Improving seeding strategy	129	38.5%
Improving fertilization strategy	111	33.1%
Developing water supply	164	49.0%
Other	61	18.2%
No. of Responses	335	

Table 7.4: Respondents' Planned Changes to Livestock Operation Over Next 5 Years

Planned Change	Number	% Indicating
No changes planned	81	23.9%
Plan on expanding herd	223	65.8%
Plan on decreasing herd	17	5.0%
Plan on selling operation	11	3.2%
Other	39	11.5%
No. of responses	339	

8 Respondents' Information Needs and Research Requirements

8.1 Current sources of advice and information

- Provincial agricultural extension agencies were the primary source of grazing program advice and information, closely followed by the media and other producers (72%, 63%, and 60% of respondents indicated using these sources, respectively; Table 8.1).

- PFRA, DU, local conservation agencies, and cattle associations were also information sources to 43%, 40%, 38% and 28% of respondents, respectively.

Table 8.1: Where Respondents Acquire Grazing Program Advice and Information

Source	Number	% Indicating
Provincial agricultural extension	240	72.5%
Local cattle association	93	28.1%
Ducks Unlimited	131	39.6%
PFRA	141	42.6%
Local/provincial conservation organizations	127	38.4%
Other producers	198	59.8%
Media (radio, television, etc.)	208	62.8%
Other	74	22.4%
No. of Responses	331	

Table 8.2: Where Respondents Would Like More Extension and Research Information

Information requirements	Number	% Indicating
Economics of pasture management systems	165	53.1%
Managing pasture forage production	196	63.0%
Benefit/cost of rotational grazing	145	46.6%
Alternative grazing systems	182	58.5%
Pasture Establishment	194	62.4%
Other	53	17.0%
No. of Responses	311	

- Forage production, pasture establishment and alternative grazing systems were listed as the most important areas where respondents would like to see more extension and research information (close to 60% of respondents for each; Table 8.2). Benefits and costs of rotational grazing and economics of grazing were each listed by almost half of respondents.

8.2 Constraints to adopting new grazing management techniques

- The factors respondents considered important to very important constraints to adopting new grazing management techniques were financial requirements (73% of respondents), labor requirements (63%), management requirements (59%), and lack of a sufficient water supply (59%; Table 7.1 and Figure 8.1).

- Lack of information about establishing/managing or on the economic benefits were considered important constraints by 26% and 29% of respondents.

8.3 Respondents' willingness to take part in further research

- Seventy-two percent of respondents said either yes or maybe to the question asking whether they would be willing to take part in an in-depth longer term grazing study (17% said yes, 55% said maybe; Figure 8.2). Only 28% of respondents said no they would not be interested in participating in further study.

- Close to 80% that said yes or maybe indicated they would require assistance (technical or financial) to set up records and to weigh cattle on and off pasture. Close to 50% would like assistance in keeping records.

- The final question of the survey was an open-ended question which gave respondents the opportunity, if they so desired, to give a written description of their grazing management program and their experiences with the program. Responses to this question ranged from a few sentences to several pages with diagrams; 217 producers responded to this question, or 63% of the total respondents.

9 Results by Province

The distribution of answers provided to each question in the questionnaire was calculated separately for each province. These distributions were all compared to the distributions for the Prairie Provinces combined. Manitoba made up 40% of respondents and Saskatchewan and Alberta made up 30% each. For the most part, differences in distributions between provinces did not appear to be considerable, however, no statistical tests of significance were performed. Differences that were observed are given below.

- Saskatchewan respondents' land base and pasture size were slightly higher than all provinces. Seventeen percent of Saskatchewan respondents reported total farmland of 1,000 acres or less, while 34% reported 1,001 to 2,000 acres and 43% reported 2,001 to 5,000 acres. For Alberta respondents, 51% reported total farmland of 1,000 acres or less, 27% reported 1,001 to 2,000 acres and 17% reported 2,001 to 5,000 acres. Manitoba distribution was very close to that of all provinces.

- Similarly, for total pasture land, Saskatchewan had fewer respondents in the smaller size categories and Alberta had more in these categories. Saskatchewan's distribution of respondents for pasture size was 36% with 500 acres or less, 29% with 501 to 1,000 acres and 33% with 1,001 to 5,000 acres. Alberta's distribution for the same size categories was 55%, 19% and 20%, respectively.

- Alberta respondents had a greater proportion of their pasture as seeded pasture, with 39% of respondents having 76 to 100% of pasture as seeded and 22% of respondents with 51 to 75% as seeded. The proportion of Saskatchewan respondents in these two categories was 17% and 15%, respectively; the proportion for Manitoba respondents was 10% and 17%, respectively.

- More Alberta respondents also made use of pasture improvement methods such as pasture reseeding (69% compared to 48% of Manitoba respondents and 47% of Saskatchewan respondents) and fertilization (69% compared to 44% of Manitoba respondents and 40% of Saskatchewan respondents).

- In other areas such as age, years farming, and proportion of income from livestock, the three provinces were quite homogeneous.

- Manitoba respondents have not been practicing their current grazing program as long as Saskatchewan and Alberta respondents, with 42% of Manitoba respondents having 1 to 5 years under their current grazing program and 31% with 6 to 10 years. For the same year categories, Saskatchewan's distribution of respondents was 26% and 26%, respectively, and Alberta's was 22% and 28%, respectively.

- Similar to the trend for total farmland and total pasture resources, Saskatchewan had fewer respondents in the small size category for their rotation system acreage, 43% with 500 acres or less, and more in the higher categories. Manitoba and Alberta had each of 60% and 55% of respondents, respectively, in the 500 acres or less size.

- As was discussed in previous sections, Alberta producers reported slightly higher productivity measures in terms of stocking rates and weight gains, while Saskatchewan reported slightly less than the total prairie province numbers. Again, Manitoba, with 40% of respondents, was closer to the entire group.

- For the more intensively managed group, Manitoba and Saskatchewan had 26% and 36% of respondents with less than 1 AUM/acre, while only 7% of Alberta respondents were in this category. Of Alberta respondents in the intensively managed group, 45% were in the 1.0 to 1.9 AUM/acre range, 38% in the 2.0 to 2.9 AUM/acre range and 10% in the 3.0 to 3.9 AUM/acre range.

- With regard to comparing their current system to the last year of their previous system: more Alberta respondents have reduced the amount of pasture fertilization (22% compared to 3% of Manitoba respondents and 10% of Saskatchewan respondents; more Alberta respondents have reduced the amount of pasture weed/brush control (22% compared to 6% of Manitoba respondents and 13% of Saskatchewan respondents); the proportion of respondents that have found an increase in labor requirements was highest in Alberta (92%), followed by Saskatchewan (88%) and then Manitoba (75%); the proportion of respondents that have found a decrease in overall costs per animal was highest in Alberta (62%), followed by Manitoba (48%) and then Saskatchewan (45%).

- Observations of improved net incomes, changes made in management practices, and observations about habitat and environment were very similar for all provinces.

- The proportion of respondents with rivers, creeks or streams on their pastures was 66% for Manitoba, 54% for Saskatchewan and 59% for Alberta; the proportion with sloughs, lakes or ponds was 75% for Manitoba, 87% for Saskatchewan and 70% for Alberta; and the proportion with dugouts was 91% for Manitoba, 88% for Saskatchewan and 84% for Alberta. A smaller proportion of Saskatchewan respondents fenced off any of these water bodies (30% compared to 60% and 57% of Manitoba and Alberta respondents, respectively.

- Manitoba had the highest proportion of respondents that had incurred new capital costs to establish their rotation system or for fencing off a water body, 85%, compared to 61% for Saskatchewan and 73% for Alberta. The distribution of total expenditures for those that had incurred new capital costs was similar between provinces; for per acre expenditures, 50% of Saskatchewan respondents were in the less than 7$ per acre category compared to 32% of Manitoba respondents and 40% of Alberta respondents. Also, 71% of Manitoba respondents indicated costs had been shared by a conservation or government agency, whereas 59% of Saskatchewan respondents and only 22% of Alberta respondents indicated costs had been shared. This latter trend could be partially a result of how mailing lists were identified in each province; as explained in the methodology section, names for Alberta's mailing list came mainly from a database kept by Alberta Agriculture Food and Rural Development of producers who would be willing to take part in research surveys, whereas many of the names from Saskatchewan and from Manitoba in particular, came from organizations working with these producers.

- There was no meaningful differences amongst provinces in responses to information needs or research requirements. Alberta indicated a lesser use of DU as a source of information than the other provinces and Saskatchewan had slightly higher use of PFRA and DU. These differences are likely a result of the source of names to be surveyed.

10 Summary and Conclusions

A survey was done in early 2000 of producers known to be using pasture and riparian management, to learn more about systems being used across the prairies and respondents' observations of changes to income, livestock and pasture productivity and habitat. Respondents were primarily operating beef cow-calf enterprises. They represented all sizes of operations, with close to half of respondents having pasture resources of less than 500 acres, a quarter between 500 and 1,000 acres and just over a quarter operating over 1,000 acres. The survey was well represented with experienced livestock operators. Most respondents were making use of rotational grazing systems on their pastures, and half of them were fencing water sources off from livestock and carrying out some forms of riparian management.

There was considerable variability to rotational grazing systems. A small number of producers only grazed paddocks or pastures once and then rested them for the rest of the year. However, most producers grazed each paddock two or three times, and almost 20% of respondents grazed some pastures or paddocks 4 times or more per year.

To summarize the main trends for livestock production on respondents' rotation systems:

- Just over half of respondents (56%) kept their livestock on their rotation system for 4 to 6 months.

- Two thirds of respondents (68%) grazed less than 0.26 animals per acre (beef animals only).

- Forty percent of respondents had stocking rates of less than one AUM/acre and 39% had 1.0 to 1.9 AUM/acre.

- Forty-seven percent of respondents had calf gains amounting to a total of 31 to 75 pounds per acre, and 23% had gains of 76 to 150 pounds per acre.

- When comparing more intensively managed pastures to less intensively managed pastures, stocking rates were higher in the more intensive pastures. The majority of respondents in the intensive group (53%) had stocking rates of 1.0 to 1.9 AUM/acre, whereas the majority of respondents in the less intensive group (52%) had stocking rates less than 1 AUM/acre.

- For total calf gains per acre, while both groups had the majority of their respondents in the 31 to 75 pound per acre range (51% for the intensively managed group and 46% for the less intensively managed group), the more intensively managed pastures had more respondents gaining over 75 pounds per acre (40%) compared to the less intensive group (31%).

Producers who changed to rotational grazing from some previous management system (primarily continuous grazing) have observed numerous improvements for both livestock and forage productivity.

- When comparing their current system to their previous system, 80% of respondents indicated livestock average weight gain was greater, 91% indicated pasture forage production quantity was greater, 88% indicated pasture forage production quality was greater and 53% of respondents indicated overwintering costs were lower for 1999 compared to the last year of their previous system.

- This increased livestock and forage productivity has enabled producers to observe positive economic changes under their current pasture management system, with 88% reporting that net farm income for the livestock enterprise was greater than it had been under the last year of their previous management system; 10% reported no difference.

- To achieve added returns and improved forage productivity, 83% of respondents had greater labor requirements and 86% had greater planning time requirements. For the majority of respondents, the increase for both of these factors was from 1 to 25% over their previous system. Many producers, however, made comments in their returned surveys that the benefits of rotational grazing made the extra labor and planning requirements worthwhile. Many also made comments that the more intensive management kept them more aware of their herd and individual livestock needs and requirements. A number of producers also commented that the livestock were more content and easier to handle under rotational grazing.

- In comparing producers' current system to the last year of their previous system, separating out the impacts of inflation, and changes in price and management practices on livestock productivity and profitability would require a more detailed, indepth level of study, particularly since the last year of their previous system will vary by producer.

- The greater proportion of respondents reported no change between their current and previous systems for herd health costs, pasture re-seeding, fertilizer use on pasture, weed/brush control, supplemental feeding and hayland and stubble grazing. However, those that did observe changes in these areas showed a pattern of lower herd health costs, more of fertilizing, weed control, and hayland grazing, and less supplemental feeding and stubble grazing.

- Producers attributed improvements to livestock productivity primarily from improved forage quantity, quality and utilization, with close to 85% of respondents rating each of these factors as important to very important factors in productivity gains. Cleaner drinking water was also recognized as an important factor toward better animal productivity by 64% of respondents.

- Respondents have also attributed livestock production gains to improvements made to their breeding stock and their herd health program, with 57% and 43% of respondents indicating these have made important contributions to livestock production gains (although 61% of respondents indicated that herd health costs were no different under their current system and 30% indicated they were lower.)

- Producers attributed forage improvements to the rest and grazing patterns of rotational grazing, with 97% of respondents rating this factor as important to very important.

- Comparing stocking rates and calf weight gains for respondents with a previous system to that of the aggregate whole of the current system, shows a similar distribution of respondents in the various categories, with the previous system showing only a slightly larger proportion of respondents in the lower stocking rate and weight gain categories. For the previous system, 88% of respondents had stocking rates under 2.0 AUM/acre compared to 80% of respondents for the current system. Regarding total calf gain per acre, 75% of respondents had gains of 75 pounds per acre or less for their previous system, compared to 67% of respondents for their current system.

Fifty percent of respondents indicated they fenced off some of their surface water bodies.

- Of those indicating the amount of land fenced off, 72% had 20 acres or less of adjacent land fenced off. The majority of respondents that indicated the type of access livestock were given to this fenced off area gave either no access (53% of respondents) or restricted access (40%).

- Comparing respondents that riparian manage to those that do not, riparian management did not reduce the proportion of respondents that experienced an increase in net returns from the livestock operation under their current rotation system in comparison to their previous system.

Producers stated the main reasons for adopting their current pasture management system were to improve their pasture condition and the long-term sustainability of their land resources (rated as important by 96% and 92% of respondents). To increase stocking rate and improve income were also rated as important by 82% and 80% of respondents; improving wildlife habitat was recognized but given less importance (43% rated as important). However improved wildlife habitat and cleaner water were high on their list of observed changes.

The highest proportion of respondents who rated reasons for giving livestock restricted or no access to water bodies cited to improve long-term sustainability of surface water bodies and improve water quality for livestock as important to very important reasons (87% and 86% of respondents, respectively).

Since adopting their current pasture management system, the majority of respondents have observed improved cover for nesting waterfowl (71% of respondents), improved livestock health and condition (72%), improved cover for upland game (60%), and improved water quality of surface water bodies (68%). Of respondents that riparian manage, 78% of respondents noticed an improvement in water, compared to 51% of respondents that do not riparian manage.

Future plans and changes for the respondents featured expansion of their livestock herd (66% of respondents), water development (49% of respondents) and riparian management (37% of respondents), improving their seeding and fertilization strategies (38% and 33% of respondents, respectively), and changing their rotation strategies (30% of respondents). Primary information needs were about pasture establishment, managing forage production and learning about alternative grazing systems. The constraints to adopting new grazing management techniques that were rated as important to very important by the majority of respondents were financial requirements (73% of respondents), labor requirements (63%), management requirements (59%), and lack of a sufficient water supply (59%).

The respondents to this survey were very enthusiastic about their pasture management systems. This was shown by their willingness to complete a questionnaire containing over fifty questions; a 41% return rate is a very good response for a mailout survey. Many of them enclosed long descriptions of their experiences and diagrams of their systems. Seventy-three percent of respondents indicated they would either be willing or may be willing to participate in a long-term more detailed economic study of this topic. Most of these said they would require financial or technical assistance in the areas of record-keeping and weighing livestock on or off pasture. The study has succeeded in identifying a source of farm data for further research into the economics of pasture management systems with emphasis on rotational grazing and riparian management.

The University of Manitoba is in fact already making use of the contacts made with Manitoba producers through the survey. Approximately 50 of these Manitoba producers are being asked to take part in on-farm interviews to collect data for a forage-beef computer model. The computer program assists producers in measuring the returns they are earning from their forage land base investment and their cost of producing dry-matter forage. The on-farm visits currently being conducted will assist in streamlining the program and will provide information for extension purposes. Participants are provided with a report for their operation. As with the present study, producers have shown a high degree of participation and enthusiasm. The computer program was also offered to all producers that took part in the present study for use on their computers.

10.1 Recommendations

Two basic recommendations are outlined below to build upon the present study.

1. It is recommended that interested agencies seize the opportunity provided by identification of the 245 producers in this study who indicated a definite or possible interest in co-operating in a more detailed, long-term economic study. The design of such a study would be based on precise records and accounts and could examine the impact of a number of conditions on livestock and forage productivity, and producer costs and benefits. Included in this could be the payback period under various scenarios for the initial investments to set-up a rotational grazing system. Some of the factors to examine could include, among others, the impact of:

    - land and water resources,
    - weather conditions,
    - market conditions,
    - management practices, and the variations in results between various levels of management intensity.

    While the present study has been of a descriptive nature based on respondents' perceptions and recall, a more intensive detailed study could provide the data for analyzing whether variations are statistically significant and the interpretation of such results. More intensive study could also give a more complete picture of all aspects of the producers management practices on their pastures, and the contributions each of these practices make to any costs and gains experienced by the operation. For example, while respondents rated the rest and grazing patterns of rotational grazing as an important contributor to any pasture forage production improvements, of interest would also be to have detailed records of any changes made to other management practices, such as fertilization or pasture reseeding, and that may have also contributed to these improvements.

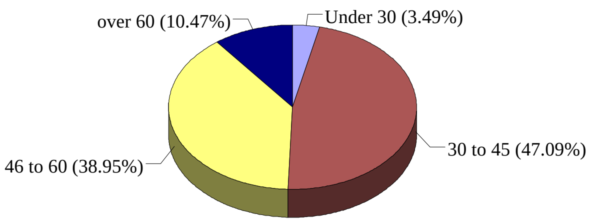
Furthermore, the present study included respondents with a wide range of management intensity, from respondents with a low level of management intensity (and of whom some practitioners and researchers of grazing management may not consider a true rotation system) to very intensive management operations. While some attempt was made here to look at differences in stocking rates and calf weight gains, it would be of interest to obtain more detailed information to examine the differences in management practices and variations in costs and benefits between operations of varying intensity.

2 It is further recommended that detailed descriptions of respondents' systems and experiences given in the final open-ended question, be compiled, edited and produced as a non-technical extension bulletin. As noted already, and as indicated by the high response rate for this survey, the respondents are very enthusiastic about the grazing management practices they are currently using. As indicated by this response rate and by the 63% of respondents that provided a description of their systems and experiences with pasture management in the final open-ended question, producers are also very willing to share their experiences. Such a bulletin would be of interest to producers already practicing such pasture and riparian management strategies and those interested in adopting such strategies, or government, conservation agencies, or cattle associations with interests in such areas. It would also help further the interests of environmental sustainability and provide further understanding of how producers combine their attitudes with technical information and their personal experiences to adjust to uncertainties of nature and the marketplace.

Pasture Survey

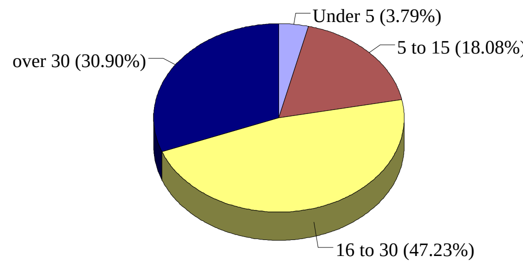
Figures Section

Figure 2.1: Age Distribution of Respondents (Years)



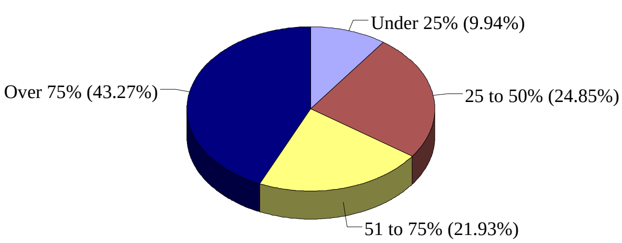
(% Distribution of 344 Respondents)

Figure 2.2 : Years Involved in Livestock



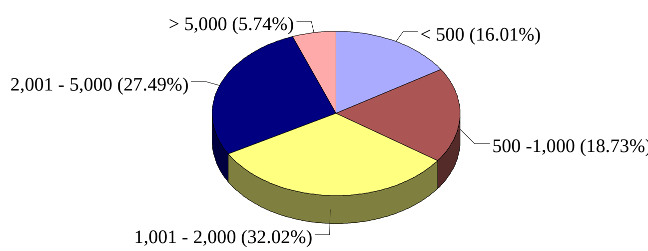
(% Distribution of 343 Respondents)

Figure 2.3 : Percent of Farm Income from Livestock



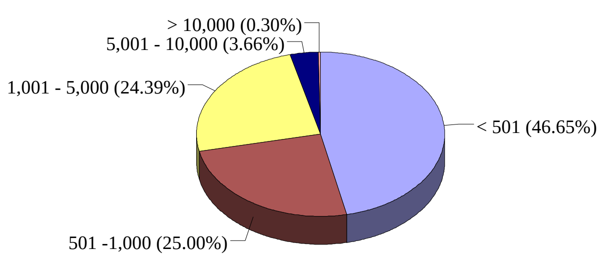
(% Distribution of 342 Respondents)

Figure 2.4 : Total Farmland of Respondents (Acres)



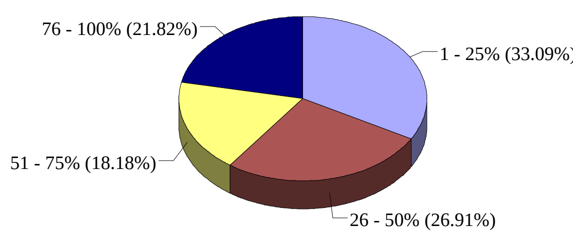
(% Distribution of 331 Respondents)

Figure 2.5: Total Pasture of Respondents (Acres)



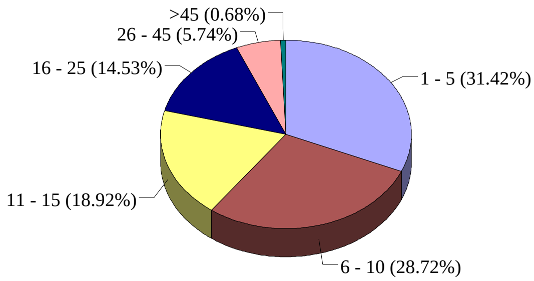
(% Distribution of 328 Respondents)

Figure 2.6 : Percent of Pasture as Seeded Pasture



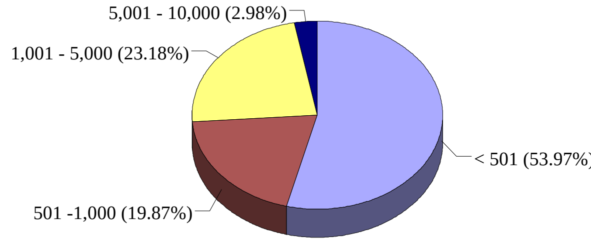
(% Distribution of 275 Respondents)

Figure 3.1 : Number of Years Under Current Rotation Grazing System



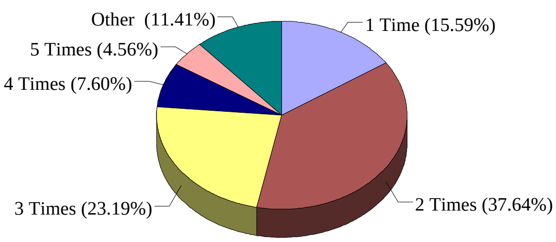
(% Distribution of 296 Respondents)

Figure 3.2: Rotation System Acreage Distribution



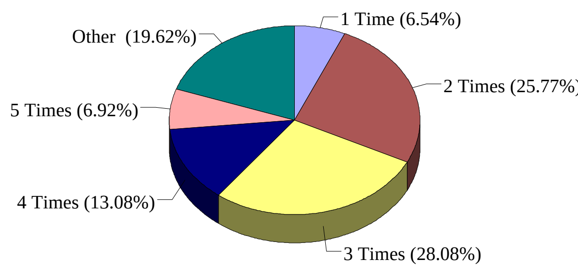
(% Distribution of 302 Respondents)

Figure 3.3: Number of Passes of Native Pasture for Rotation Grazing Season



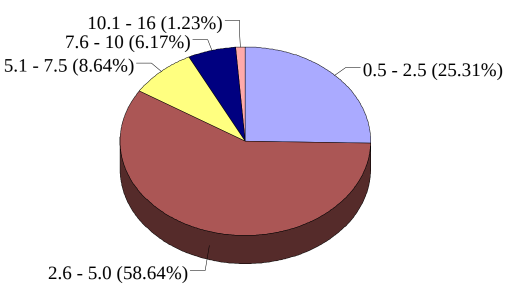
(% Distribution of 262 Respondents)

Figure 3.4: Number of Passes of Seeded Pasture for Rotation Grazing Season



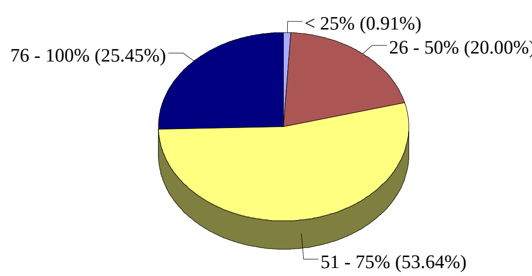
(% Distribution of 259 Respondents)

Figure 3.5: Forage Height (Inches) Used by Respondents for Determining When to Move Livestock



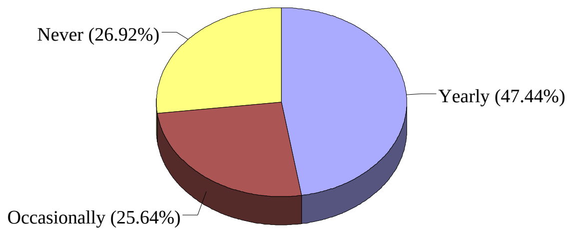
(% Distribution of 162 Respondents)

Figure 3.6: Percent Utilization of Pasture/Paddock before Respondents Moved Livestock



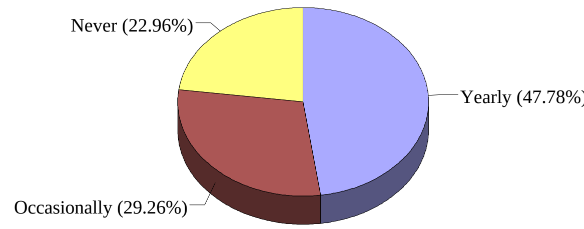
(% Distribution of 110 Respondents)

Figure 3.7: Respondents' Frequency of Stubble Grazing



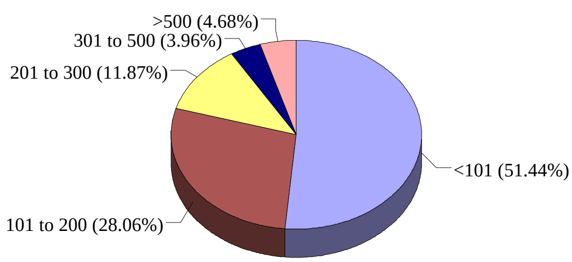
(% Distribution of 234 Respondents)

Figure 3.8: Respondents' Frequency of Hayland Grazing



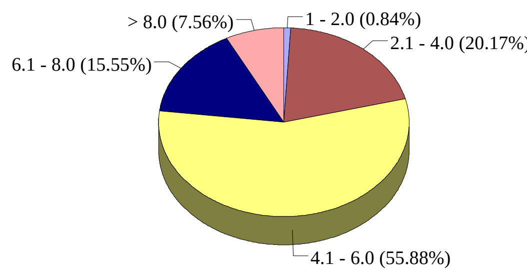
(% Distribution of 270 Respondents)

Figure 4.1: Total Animals on Rotation Pasture (for Operations that are Mainly Beef*)



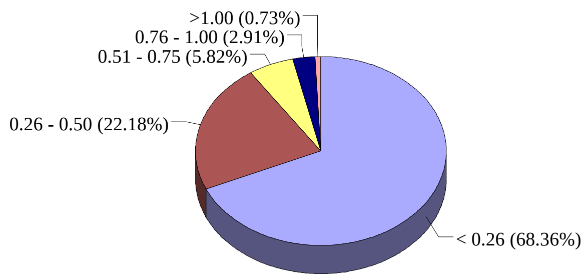
(% Distribution of 278 Respondents)
***Includes cow/calf pairs, bulls, replacements and feeder cattle**

Figure 4.2: Cow/Calf Pairs, Months on Rotation Pasture (for all Respondents with Beef Animals)



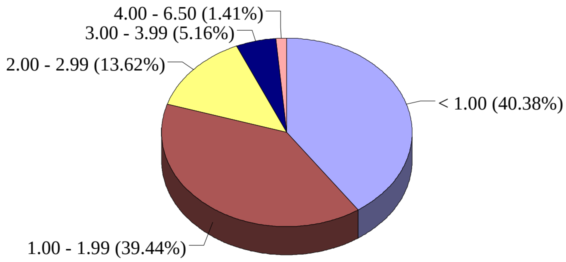
(% Distribution of 238 Respondents)

Figure 4.3: Total Animals/Acre of Rotation Pasture (for Operations that are Mainly Beef*)



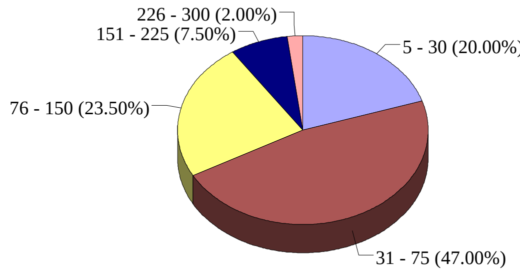
(% Distribution of 275 Respondents)
***Includes cow/calf pairs, bulls, replacements and feeder cattle**

Figure 4.4: 1999 Stocking Rate of Rotation Pasture, All Livestock, AUM/Acre



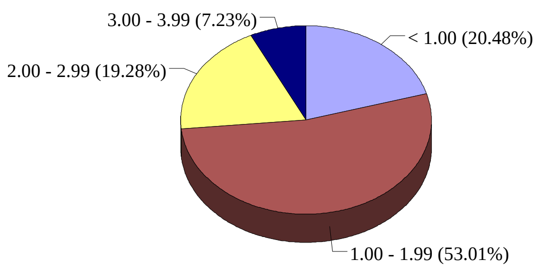
(% Distribution of 213 Respondents)

Figure 4.5: 1999 Respondents' Calf Gain/Acre (lbs.) of Rotation Pasture



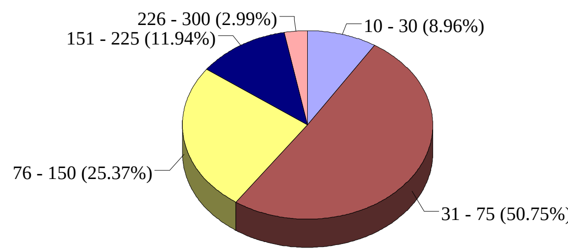
(% Distribution of 200 Respondents with Mainly Cow/Calf Operation)

Figure 4.6: 1999 Stocking Rate for Intensively Managed Rotation Pastures, All Livestock, AUM/Acre



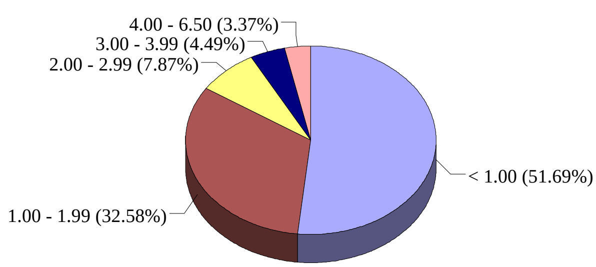
(% Distribution of 83 Respondents)

Figure 4.7: 1999 Respondents' Calf Gain/Acre (lbs.) of Pasture for Intensively Managed Rotation Pastures



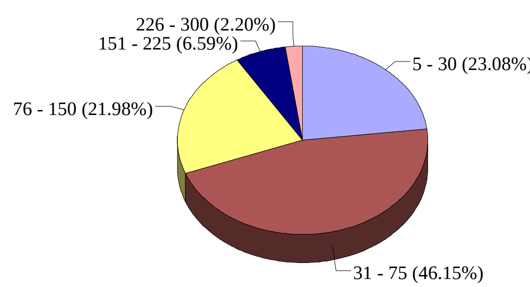
(% Distribution of 67 Respondents with Mainly Cow/Calf Operation)

Figure 4.8: 1999 Stocking Rate for Less Intensively Managed Rotation Pastures, All Livestock, AUM/Acre



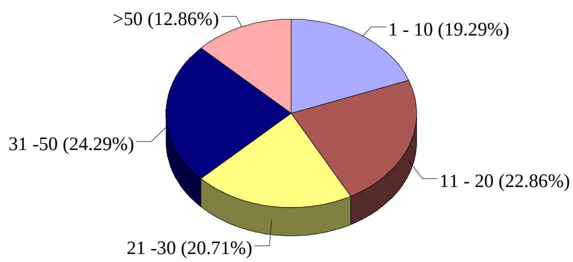
(% Distribution of 89 Respondents)

Figure 4.9: 1999 Respondents' Calf Gain/Acre (lbs.) of Pasture for Less Intensively Managed Rotation Pastures



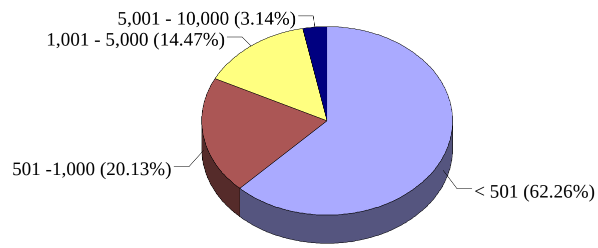
(% Distribution of 91 Respondents with Mainly Cow/Calf Operation)

Figure 5.1: Number of Years Rotation Pastures were under a Different Grazing Program



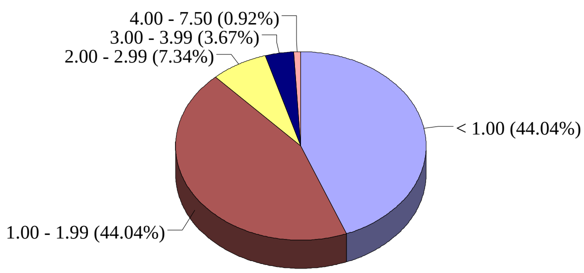
(% Distribution of 140 Respondents)

Figure 5.2: Respondents' Total Pasture Under their Previous Management System (Acres)



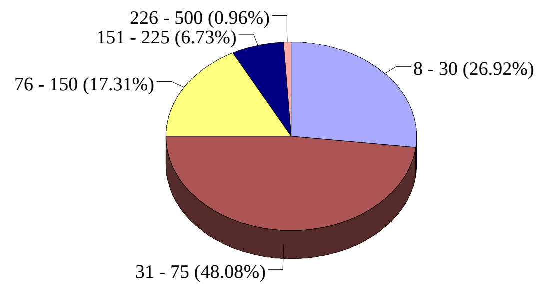
(% Distribution of 159 Respondents)

Figure 5.3: Stocking Rates Under Previous Management Program, All Livestock, AUM/acre



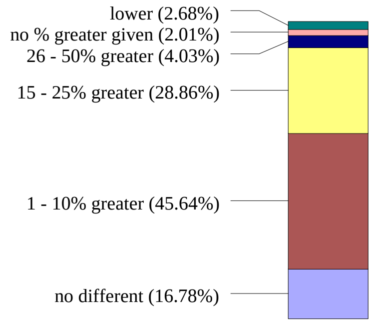
(% Distribution of 109 Respondents)

Figure 5.4: Respondents' Calf Gain/Acre (lbs.) of Pasture Under Previous Pasture Management Program



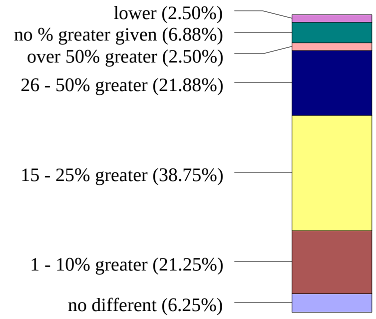
(% Distribution of 104 Respondents with Mainly Cow/Calf Operation)

Figure 5.5: % Change of 1999 Compared to Previous System for Average Livestock Weight Gain on Pasture



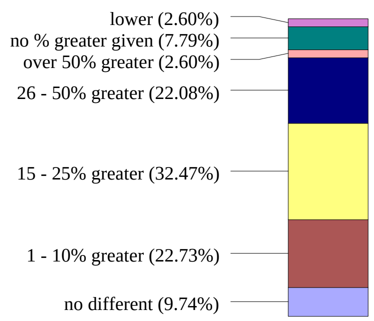
(% Distribution of 149 Respondents)

Figure 5.6: % Change of 1999 Compared to Previous System for Pasture Forage Production Quantity



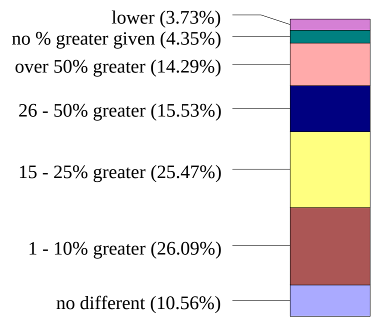
(% Distribution of 160 Respondents)

Figure 5.7: % Change of 1999 Compared to Previous System for Pasture Forage Production Quality



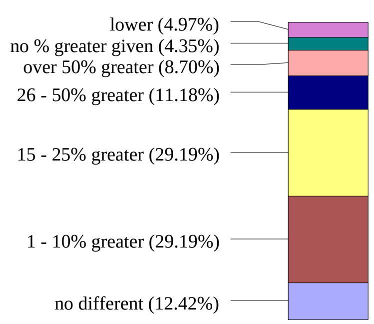
(% Distribution of 154 Respondents)

Figure 5.8: % Change of 1999 Compared to Previous System for Time Spent on Planning and Management



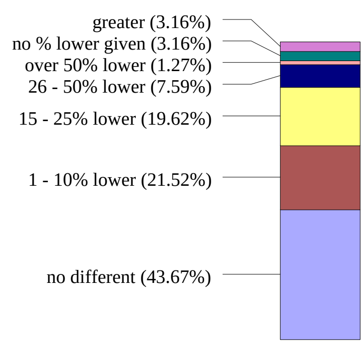
(% Distribution of 161 Respondents)

Figure 5.9: % Change of 1999 Compared to Previous System for Labor Requirements



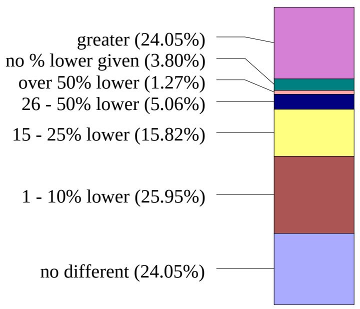
(% Distribution of 161 Respondents)

Figure 5.10: % Change of 1999 Compared to Previous System for Overwintering Costs



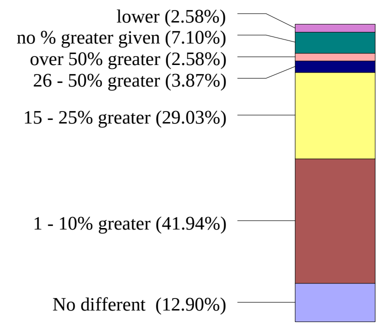
(% Distribution of 158 Respondents)

Figure 5.11: % Change 1999 Compared to Previous System for Overall Costs per Animal



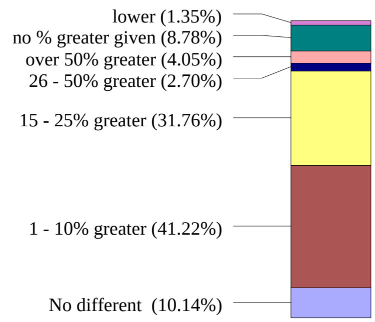
(% Distribution of 158 Respondents)

Figure 5.12: % Change 1999 Compared to Previous System for Overall Net Return/Animal



(% Distribution of 155 Respondents)

Figure 5.13: % Change 1999 Compared to Previous System for Overall Net Return for Livestock Operation



(% Distribution of 148 Respondents)

Figure 5.14: Importance of Factors Contributing to on Pasture Livestock Weight or Stocking Gains

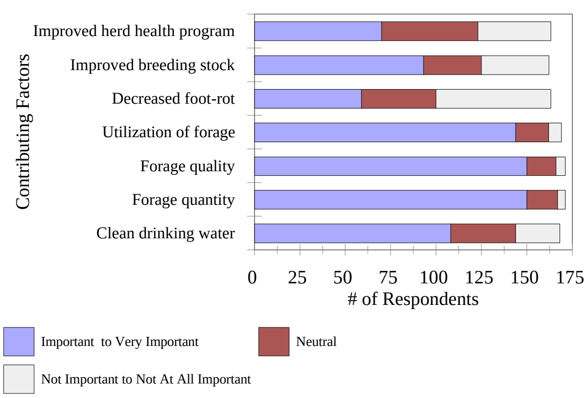


Figure 5.15: Importance of Factors Contributing to Pasture Forage Improvements

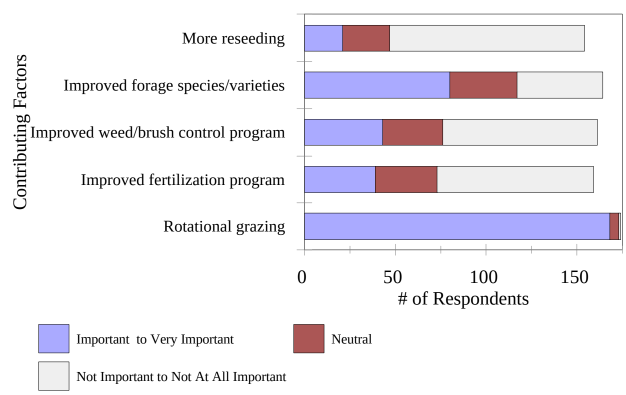
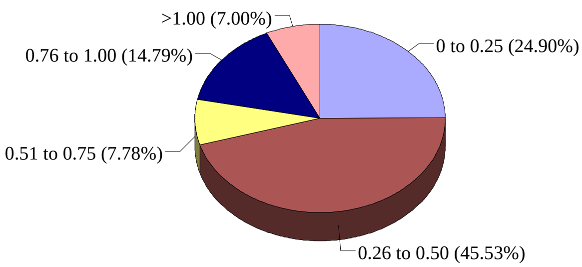
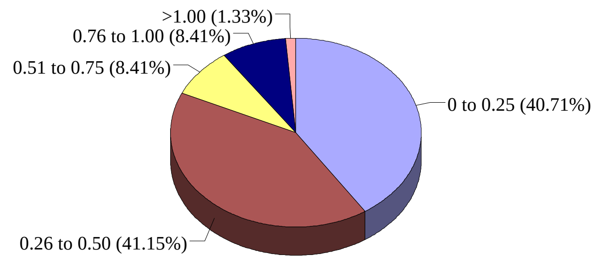


Figure 6.1: Maximum Distance to Water on Pastures (Miles)



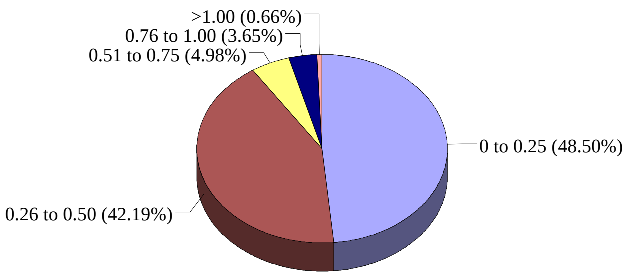
(% Distribution of 257 Respondents)

Figure 6.2: Maximum Distance to Water on Paddocks (Miles)



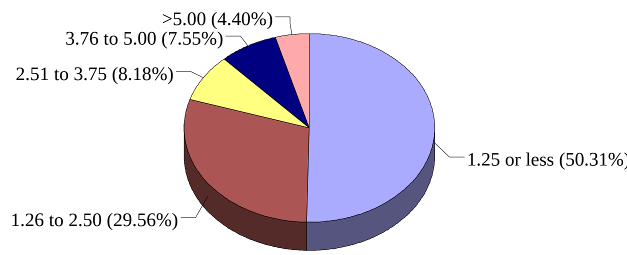
(% Distribution of 226 Respondents)

Figure 6.3: Livestocks' Average Distance to Water (Miles)



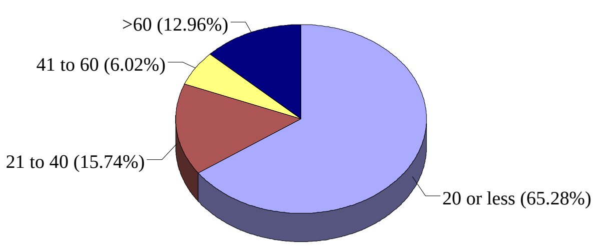
(% Distribution of 301 Respondents)

Figure 6.4: Miles of Rivers, Creeks or Streams on Pasture



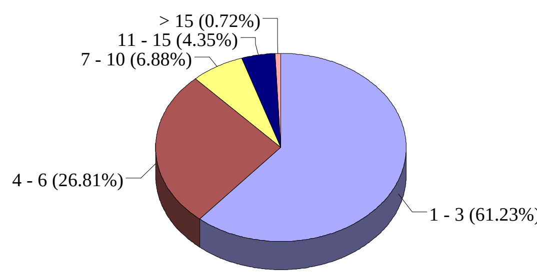
(% Distribution of 159 Respondents)

Figure 6.5: Acres of Sloughs, Lakes or Ponds on Pasture



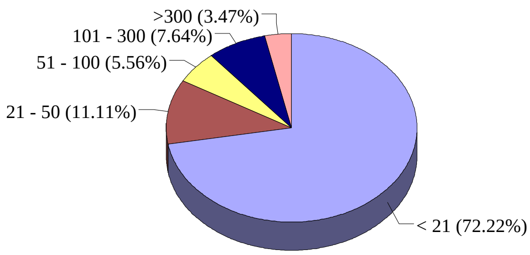
(% Distribution of 216 Respondents)

Figure 6.6: Number of Dugouts on Pasture



(% Distribution of 276 Respondents)

Figure 6.7 : Acres of Land Fenced Around Surface Water Bodies on Pasture



(% Distribution of 144 Respondents that indicated amount)
162 Respondents (50%) Indicated they Fenced Off Surface Water Bodies

Figure 6.8: Livestock Access to Fenced Off Surface Water Bodies on Pasture

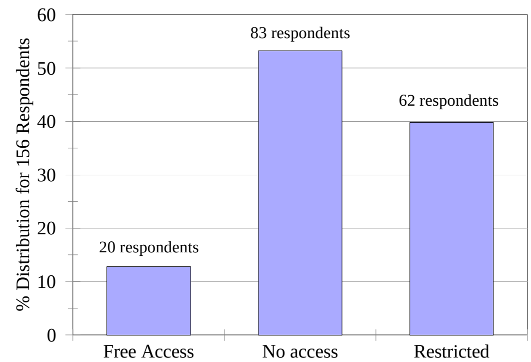
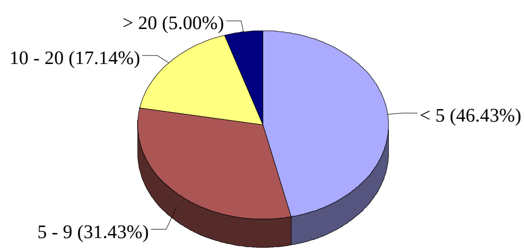
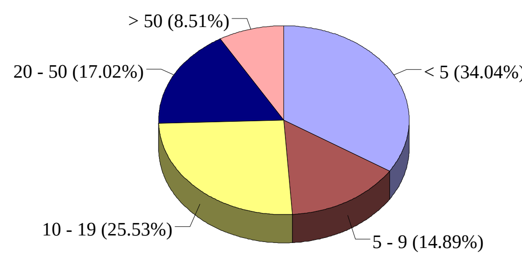


Figure 6.9: Number of Years Livestock have had Restricted or No Access to Fenced Area



(% Distribution of 140 Respondents)

Figure 6.10: Number of Days Livestock have Access to Fenced Off Area During Grazing Season



(% Distribution of 47 respondents that indicated they allow periodic grazing)

Figure 7.1: Respondents' Rating of Importance of Reasons for Using Rotation Grazing

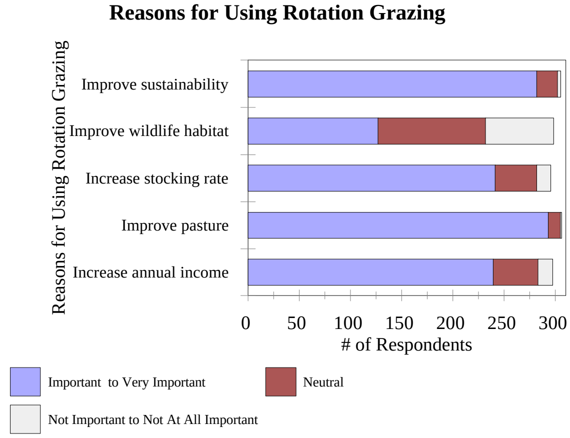
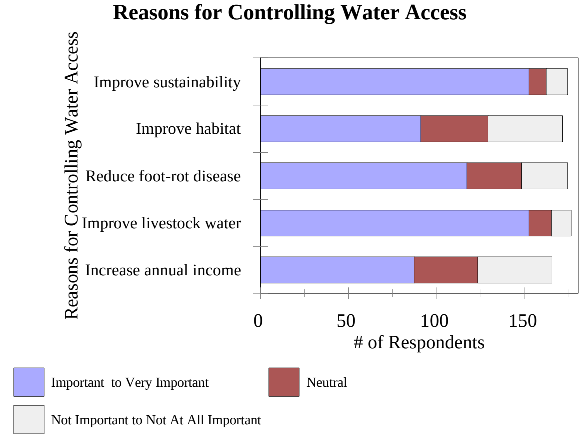


Figure 7.2: Respondents' Rating of Importance of Reasons for Controlling Water Access



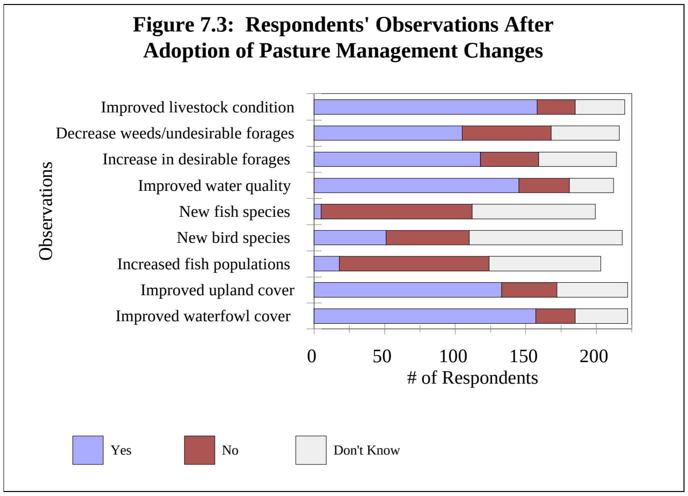


Figure 7.3: Respondents' Observations After Adoption of Pasture Management Changes
Observations
Improved livestock condition
Decrease weeds/undesirable forages
Increase in desirable forages
Improved water quality
New fish species
New bird species
Increased fish populations
Improved upland cover
Improved waterfowl cover
0
50
100
150
200
# of Respondents
Yes
No
Don't Know

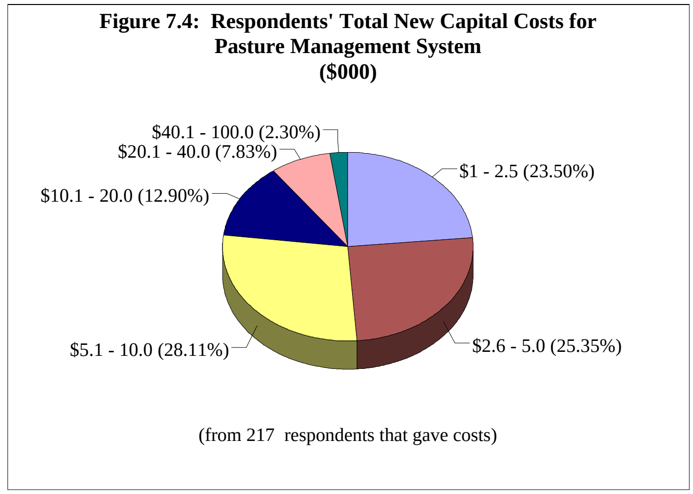


Figure 7.4: Respondents' Total New Capital Costs for Pasture Management System ($000)
$40.1 - 100.0 (2.30%)
$20.1 - 40.0 (7.83%)
$1 - 2.5 (23.50%)
$10.1 - 20.0 (12.90%)
$5.1 - 10.0 (28.11%)
$2.6 - 5.0 (25.35%)
(from 217 respondents that gave costs)

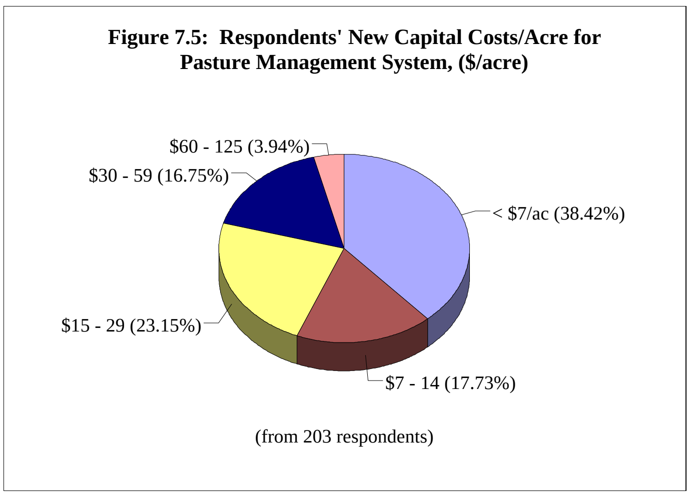


Figure 7.5: Respondents' New Capital Costs/Acre for Pasture Management System, ($/acre)
$60 - 125 (3.94%)
$30 - 59 (16.75%)
< $7/ac (38.42%)
$15 - 29 (23.15%)
$7 - 14 (17.73%)
(from 203 respondents)

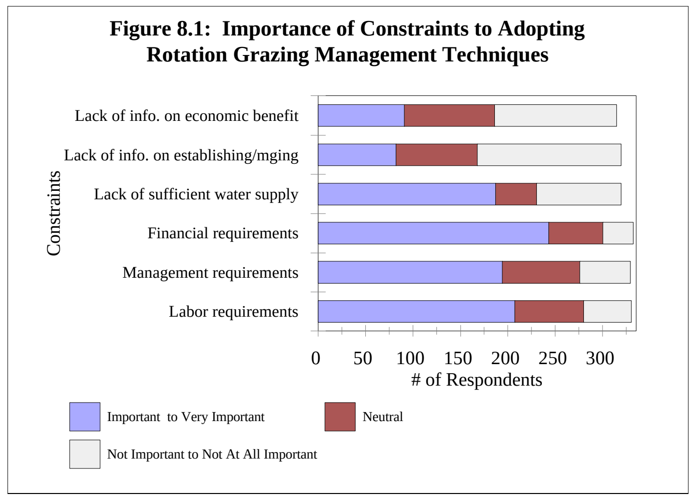


Figure 8.1: Importance of Constraints to Adopting Rotation Grazing Management Techniques
Constraints
Lack of info. on economic benefit
Lack of info. on establishing/mging
Lack of sufficient water supply
Financial requirements
Management requirements
Labor requirements
0
50
100
150
200
250
300
# of Respondents
Important to Very Important
Neutral
Not Important to Not At All Important

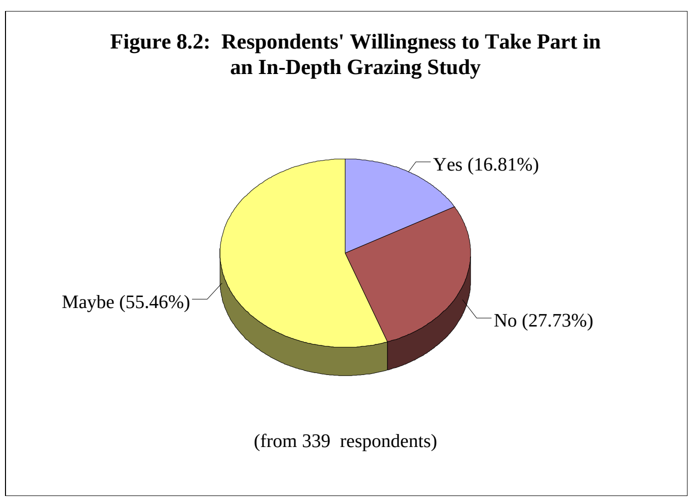


Figure 8.2: Respondents' Willingness to Take Part in an In-Depth Grazing Study
Yes (16.81%)
Maybe (55.46%)
No (27.73%)
(from 339 respondents)

Pasture Survey

Appendix

Pasture Survey Steering Committee Members

Lorne Colpitts	Manitoba Habitat Heritage Corporation
Tim Sopuck	Manitoba Habitat Heritage Corporation
Don Green	Manitoba Agriculture and Food
Tom Harrison	Saskatchewan Wetland Conservation Corporation
Brant Kirychuk	Prairie Farm Rehabilitation Administration
Tamara Lewis	Alberta Agriculture Food and Rural Development
Wanda McFadyen	Manitoba Cattle Producers Association
Daryl Nazar	Ducks Unlimited
Bill Poole	Duck Unlimited
Steve Sager	Prairie Farm Rehabilitation Administration
Peggy Strankman	Canadian Cattlemen's Association
Dr. Jim MacMillan	University of Manitoba
Brenda Chorney	University of Manitoba
Rea Josephson, Project Director	University of Manitoba

Calculation of Rotation System Stocking Rates

Stocking rates are expressed in animal unit months per acre (AUM/acre). AUM/acre for each respondent was calculated by first multiplying the number of animals for a particular animal type by its animal unit equivalent (AUE) and then by the number of months on the rotational system. This gave AUM's for each animal type, which was divided by the rotation system's acreage to get AUM/acre for each animal type (e.g. cows, replacements, feeders, bulls, other animal species).

AUE's for each animal type was obtained by dividing the on pasture weight given by the respondent by weights given in Manitoba Agriculture and Food[5] for animal unit equivalent conversions, to determine the AUE's for each animal type for each producer. Calves are considered part of the cow AUE up to approximately six months of age and therefore were not assigned any AUE's. Therefore, for respondents whose calves are on the rotation pasture past six months of age and if this time is within the time given on the rotation system there will be some underestimation of AUM's/acre.

As respondents did not give weights for horses these animal types were assigned the standard 1.2 AUE per animal from Manitoba Agriculture and Food. Once AUM/acre for each animal type was calculated, these were summed to give total livestock AUM/acre for each respondent.

There were 4 respondents with dairy cows. These were excluded from the stocking rate calculations due to the amount of time spent off pasture and the supplemental feeding that is required for dairy livestock. There were also two bison ranchers, 8 sheep ranchers, and one elk rancher that were not included in the stocking rate calculations.

Some respondents provided all the information required for calculating stocking rates for only some of the livestock kept on their rotation system. If any pieces of required information for calculating AUM/acre was missing for any livestock type, then that respondent was not included in stocking rate calculations. The exception was with bulls. Twenty-three percent of respondents that provided numbers of bulls of pasture did not provide bulls' on pasture weights for their current system and 30% did not provide time on pasture. Rather than exclude these observations from the calculations and because for the most part respondents only had a few bulls on pasture, a weighted average for all respondents that did provide weights was used for those with missing bull weights (weighted average was 1839 pounds for the 77% of respondents that provided on pasture weights). Two respondents that raised purebred seedstock were excluded from the weighted average calculations, as they had a larger number of what appeared to be young bulls. For the 30% of respondents that were missing months on pasture, the cow/calf units months on pasture for that respondent was used. Similarly for the previous system, there were 31% of respondents that did not give bull on pasture weights and a weighted average was calculated from the 69% that did give weights (one respondent with purebred seedstock excluded); and for the 21% did not give time on pasture the time for that respondent's cow/calf unit was used.

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[5] Animal Unit Months, Stocking Rate and Carrying Capacity; www.gov.mb.ca

The calculations of stocking rates are based on the total animals each respondent has on their rotation system and are calculated as a whole for that respondent's rotation system. This gives some idea of the utilization of the respondent's entire rotation system resource but does not give a complete picture of the usage and stocking pressure on the various components of their rotation system. For example, a respondent may be utilizing one part of their rotation system much more than another part over the grazing season, applying the bulk of the stocking pressure to that parcel. Further and more detailed study would give a clearer and more accurate picture of respondents' usage of the various parts of their rotation system.