ADOPTION OF RANGE MANAGEMENT INNOVATIONS
BY UTAH LIVESTOCK PRODUCERS

by

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ABSTRACT

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Recent years have seen changes in ecological conditions, ownership patterns, and political-legal forces that affect the sustainability of Western range livestock production. Enterprise diversification and implementation of improvements are advocated as ways for ranchers to cope with marginal returns from ranching while better managing resources. However, relatively few ranchers make such substantive changes in their operations, and previous research suggests that rates of adoption may be especially low in Utah.

Using a qualitative approach, this study explored innovation adoption among Utah ranchers. During preliminary interviews with 13 key informants, commitment to traditional ranching lifestyles, the state's settlement pattern, and availability of time and capital were identified as barriers to adoption. In-depth interviews were then conducted with 15 producers known within the ranching community for innovative management. Objectives of these interviews were to identify personal characteristics of the respondents,
preferred information sources, and motivations for and barriers to adoption.

Most respondents were ranching full-time on multi-generation, family ranches, and living on or very near the ranch. Respondents innovate in order to improve profitability, environmental quality, and relationships with resource management agencies and to demonstrate good environmental stewardship to the public. Interaction with extension agents and ranching organizations was common and affected the perceived risk associated with adoption. Motivation to maintain the ranch may be especially strong among interviewees: Each respondent reported being committed to ranching for his lifetime, and in most cases, the ranch is expected to remain in the family for at least one more generation. Individuals who are less dependent on public land and more dependent on ranching income may be more likely to adopt innovations.

Even among innovative ranchers, the availability of time and capital as well as commitments to tradition impeded adoption. Unexpectedly, characteristics of the political-legal system in which ranchers operate emerged as barriers to innovation. This research illustrates how the existing innovation adoption framework applies to ranchers, but also defines new theoretical components.
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CHAPTER I
INTRODUCTION

The profitability of ranching throughout the western United States is low, with ranchers commonly experiencing negative returns to investments (Smith and Martin 1972, Pitt and Kerr 1978, Capps and Workman 1982, Bartlett et al. 1989, Workman and Evans 1993, Starrs 1998). An economic analysis of the typical Utah ranch in 1990 revealed a $28,446 negative net return (Workman and Evans 1993). A similar analysis revealed an average negative net return for both large and small Utah ranches in 1977 (Capps and Workman 1982). Because this bleak scenario is not constant from year to year, ranch families often must survive by earning off-ranch income, postponing the replacement of equipment, or refinancing the ranch (Workman and Evans 1993).

“Ability to stay in the business can also be attributed to ranchers’ acceptance of low income and return on investment” (Pitt and Kerr 1978:204). Others, however, find that it is more appealing, rational, or necessary to sell their operation. Many people perceive this to be a problem because as ranchers are forced out of the business, their land is often sold and subdivided (Rowe et al. 2001). The resulting resource fragmentation could have serious negative effects on wildlife and plant species of range ecosystems (Knight et al. 1995), and a sudden influx of small-tract landowners with few ties to ranching or the local community can bring considerable disruption of rural social systems (Brunson and Wallace 2002). Pitt and Kerr (1978:204) note the importance of the “extra-market benefits” provided by ranching to society, including financial stability of the local community and the continuation of a domestic, locally produced beef supply.
While there is a growing concern for the economic sustainability of ranching, there is a simultaneous effort to improve the environmental quality associated with agriculture. Some agricultural practices (e.g., pesticide/fertilizer use and certain tillage practices) that have been used to increase profitability have also been a source of environmental degradation (Buttel and Swanson 1986). In response to such problems, range improvement practices have been developed. However, little is known about the adoption rates of these practices among ranchers and the factors that facilitate or discourage adoption (Coppock and Birkenfeld 1999).

Cedar Mountain Initiative

This research was conducted as a part of the Cedar Mountain Initiative (CMI), and was intended to provide a deeper understanding of how livestock producers adopt rangeland management practices. The overall purpose of the CMI is to explore ways to enhance the economic sustainability of Utah ranches. The Utah Legislature charged the Utah Agricultural Experiment Station with this task in 1999. In an effort to accomplish this task, a multidisciplinary team of researchers was organized to investigate wildlife/livestock interactions, domestic livestock grazing, and aspen regeneration on mountain rangelands. In theory, the research will be conducted, beneficial technologies will be developed as a consequence of the research and subsequently adopted by livestock producers, and benefits will be realized by rural communities, individual ranchers, sportsmen, and other Utah citizens. Since those benefits require not only the success of the research but also the success of programs to encourage adoption of new
practices by ranchers, an understanding of the adoption process within the ranching community is essential to the success of the CMI.

Purpose of Study

In an effort to develop a better understanding of the adoption process among Utah's livestock producers, this study was designed to explore innovation adoption by discussing the implementation of new practices with Utah’s most innovative ranchers. The next chapter provides an overview of adoption-diffusion research and then offers a review of relevant literature developed in the agriculture and rangeland disciplines. Chapter III describes the qualitative approach used for this study, which included two research phases. The results, presented in Chapter IV, provide insight to the factors influencing adoption and personal characteristics of innovative ranchers, and may be useful for extension agents, Natural Resources Conservation Service (NRCS) employees, or others seeking to promote improvement in range management. The paper’s conclusion (Chapter V) offers ideas for applying the findings of this study to range management.
CHAPTER II

LITERATURE REVIEW

Adoption-Diffusion Research

Social scientists began to study innovation adoption in the 1930's. Adoption-diffusion research has become a multi-disciplinary endeavor, and the basic findings of traditional studies are applicable to many fields. An innovation is “an idea, practice, or object that is perceived as new by an individual or other unit of adoption” (Rogers 1995:11). Innovations are spread to members of the social system through the process known as diffusion.

The traditional diffusion model, in its most simplistic form, is based on the idea that the potential adopter’s access to information about the innovation is the “principal factor affecting the adoption decision” (Hooks et al. 1983:309). The assumption is that the potential adopter receives information about the innovation and its associated advantages, and will then make a rational decision to adopt. However, researchers have argued that this simplistic model is not sufficient to explain innovation adoption (Hooks et al. 1983, Saltiel et al. 1994). Rogers (1995) explains that encouraging the adoption of innovations, even when the associated benefits are apparent, is often difficult.

Certain variables have been identified as factors that affect the adoption decision. The attributes of innovations, personal characteristics of potential adopters, and the structure of social systems appear to influence the decision, although the effect of these variables is specific to the innovation being studied. Fliegel and van Es (1983) and
Dewees and Hawkes (1988) warn that it is difficult to generalize results across innovations.

**Personal Characteristics of the Adopter**

Innovativeness, as defined by Rogers (1995:22), is the “degree to which an individual or other unit of adoption is relatively earlier in adopting new ideas than the other members of a system.” Adoption-diffusion research has revealed that innovators and early adopters generally have higher levels of education, are younger, more actively seek information, and have higher social status and income than late or nonadopters. Innovators and early adopters also have high levels of exposure to mass media and large interpersonal networks. These individuals possess less fatalistic attitudes than late or nonadopters. This means that they believe they are in control of their lives and take action to make things happen instead of simply reacting to circumstances.

It is important to understand the adoption process among innovators and early adopters because of their influence on the other members of the social system. Rather than relying on scientific information about an innovation, most individuals seek information about the innovation from peers who have personal experience with it (Rogers 1995). Innovators are the first members of a system to adopt an innovation. These individuals are less risk-averse and seek information from outside the local system. Although often distrusted by others in the system, innovators play an important role in the diffusion process. By adopting an innovation that is foreign to the local system, innovators introduce the innovation to the other members (Rogers 1995).
Early adopters are also quick to adopt innovations, but do so after the consequences of adoption are made more clear from the innovators’ experiences. The early adopters further reduce uncertainty associated with the innovation by adopting it and sharing the outcome with peers. In most cases, early adopters are the system’s opinion leaders. In other words, these individuals are respected by other members of the system and have informal influence on the attitudes and behaviors of the others. While opinion leaders often exhibit a high degree of innovativeness, they must also retain a certain level of conformity to local norms in order to hold their influential positions (Rogers 1995). This works in favor of innovation adoption when the system is oriented to change, but adoption can be hindered when the reverse is true. In a social system that places high value on traditional lifestyles, as ranching communities often do, the opinion leaders may not be early adopters.

**Attributes of Innovations**

Five characteristics of innovations are generally accepted as influences on the adoption decision. It is the potential adopter’s perception of these attributes that must be considered by researchers and change agents. These characteristics include relative advantage, compatibility, complexity, trialability, and observability (Rogers 1995).

Relative advantage is the degree to which an innovation is perceived to be more beneficial than the one it replaces. This characteristic is most commonly judged in economic terms, but may also be measured according to the levels of convenience, social prestige, and satisfaction associated with adoption. Compatibility is the degree to which an innovation appears to be consistent with the adopter’s current operation, values, and
needs. Complexity is the degree to which an innovation can be easily understood and implemented. Innovations that are compatible with the current operation and less complex can be implemented with less effort. Trialability refers to the degree to which an innovation can be tested on a small-scale prior to adoption. If an innovation can be tested on a small-scale, the uncertainty associated with adoption will be reduced. Observability is the degree to which the effects of an innovation are visible to the adopter and other individuals. In theory, innovations that appear to demonstrate higher degrees of relative advantage, compatibility, trialability, observability, and less complexity, will be adopted more quickly (Rogers 1995).

**Characteristics of the Social System**

Rogers (1995:23) defines a social system as “a set of interrelated units that are engaged in joint problem solving to accomplish a common goal.” For instance, a “common goal” within the ranching social system may be lifestyle maintenance. It may be more difficult, however, to define a common goal for the rural social system as a whole because it may include people in various occupations with different motivations. The structure of the system affects diffusion in many ways. Each social system is structured uniquely, and this structure can either facilitate or discourage adoption. Relatively little research has been conducted on the effects of the system’s structure on the adoption decision. However, it is generally accepted that norms and certain individuals (e.g., opinion leaders) within the system have a significant impact on adoption decisions. Understanding the role of the social system is important because researchers have discovered, in many cases, the potential adopter does not have complete

Characteristics of the Operation

Characteristics of the operation are considered to be additional factors influencing adoption among agricultural producers (Bultena and Hoiberg 1983, Lacey et al. 1985). As an example, the availability of labor and capital resources for investment in innovation may be affected by the size of the operation. For ranchers, size of the operation depends on the amount of land used as well as the size of the livestock herd. Further considerations for applying innovation adoption theory to agricultural producers are discussed below.

Innovation Adoption in Agriculture

The knowledge base that has been developed in agriculture provides insight to innovation adoption among ranchers. Ranching is a form of agriculture, therefore ranchers and farmers face similar obstacles to innovation adoption. Because the typical Utah ranch includes several acres of cropland, many of the state’s ranchers can also be called farmers (Peterson 1997). Agricultural producers experience a high degree of uncertainty associated with their operations. Economic, institutional, social, and environmental factors create this uncertainty. High competition, product price instability, and low returns to investment are characteristic of the agricultural market (Workman et
The individual rancher “operates in a purely competitive market in which his production is an insignificant portion of the total beef supply” (Workman et al. 1972:340). Governmental regulation (an institutional factor) and environmental movements (a social factor) can potentially increase uncertainty. Agricultural producers in the Intermountain West operate under limiting conditions of the physical environment, including semiarid climate and rugged terrain (Kearl 1975, Saltiel et al. 1994). These lands are not highly productive, thereby reinforcing the low returns experienced in the industry. The high degree of uncertainty increases the risk associated with innovation adoption. The producers, perceiving a need for immediate returns to cope with uncertainty, initiate short-term planning efforts, which usually do not include the adoption of practices designed to enhance land productivity and resource conservation (Pitt and Kerr 1978, Buttel and Swanson 1986).

**Adoption of Sustainable Agricultural Practices**

An increased concern for the environmental risk associated with agricultural production has produced a demand for sustainable agricultural practices (Saltiel et al. 1994). This demand for environmental sustainability often directly conflicts with societal demands for high productivity (Swanson et al. 1986). Goals of sustainability and high productivity, in many cases, cannot be achieved simultaneously. In addition, the lack of a general agreement on the definition of sustainability limits efforts to satisfy societal demands (Saltiel et al. 1994).
The adoption of profitable innovations has been the focus of much agricultural research. However, researchers have argued that the adoption of conservation practices can be a different process (Pampel and van Es 1977, Buttel and Swanson 1986, Swanson et al. 1986). Encouraging the adoption of conservation practices can be more difficult due to the economic constraints of the operators. Farmers are commonly faced with decisions to improve environmental quality or profitability. Usually, a decision to survive economically is made (Swanson et al. 1986). The highly competitive environment of the farming industry motivates farmers to maximize short-term returns.

Profitability associated with sustainable agricultural practices was determined to be the most significant factor influencing the adoption decision among Montana farmers (Saltiel et al. 1994). Swanson et al. (1986:112) explain that adoption of conservation practices is discouraged because “returns to investment in conservation are low and usually not realized for years.” The traditional diffusion model assumes that increased profitability for the farmer is an incentive to adopt new technologies, but with the adoption of environmental practices, the outcomes benefit society as a whole. The individual farmer’s interests, in these situations, are secondary to societal goals (Fliegel and van Es 1983). Therefore, even though many people agree farmers have a stewardship obligation, it cannot be expected that they will voluntarily invest in conservation practices when constrained by scarce capital resources (Buttel and Swanson 1986).

In addition to economic constraints, research has revealed other factors that impact the adoption of conservation practices. In a study of the adoption of agricultural
Best Management Practices (BMPs), Nowak and Korschning (1983) found that even if economic incentives were offered to reduce the initial costs of implementing the practices, many farmers did not have the managerial skills, additional capital, or knowledge required for continued use of the BMPs. Additionally, farmers that adhere strongly to traditional farming methods were unlikely to implement BMPs (Nowak and Korschning 1983).

A study of Iowa farmers and the adoption of conservation tillage revealed farmers with larger operations, because they had more money to invest and better managerial skills, were more likely to use conservation tillage (Bultena and Hoiberg 1983). Adopters were also younger, more educated, more familiar with newer practices, and were more likely to accept the risk associated with adoption. In this study, the factor that had the greatest effect on decisions to adopt was the operator's perception of others' responses to the innovation. The adoption of conservation tillage is a highly visible modification to the farm and the response of neighbors and friends to the innovation appeared to be an important determinant of adoption. This finding exemplifies the powerful influence of the social system and local norms on adoption decisions.

**Innovation Adoption among Ranchers**

Few research efforts have focused on innovation adoption within the ranching community. Although knowledge of the adoption process among farmers is applicable to ranchers, differences exist between the two groups and it is uncertain how these differences affect adoption. Both Grigsby (1980) and Jorgensen (1984) describe the
farmer-rancher dichotomy and provide insight to how it might influence management of the land. However, it remains unclear how even this information applies to Utah producers. To Jorgensen (1984:11), a prominent difference between the two subsets of agricultural producers was the fact that western farmers “tend to live in nucleated towns” while western ranchers deeply value “physical isolation of houses on the landscape.” The settlement pattern of Utah, heavily influenced by the Mormon church, encouraged ranchers to settle in town. Grigsby (1980:95) discusses the differences in values and motivations of “farmer-ranchers” and traditional ranchers. Here again, the issue is complex because the Utah rancher is usually involved in farming activities and can be considered a farmer as well as a rancher (Peterson 1997).

Lacey et al. (1985) explored the adoption of range improvement practices among Eastern Montana ranchers. This study revealed that operators of larger ranches invested more frequently in range improvements than operators of smaller ranches. These ranchers commonly invested in structural improvements (e.g., water developments and fencing) as opposed to nonstructural improvements (e.g., seeded pastures and fertilizers). The researchers speculated that operators of larger ranches were able to adopt range improvements because the per-animal cost is lower for these ranchers and they may be investing the difference in improvements. These results are compatible with those found in agricultural research. It appears that ranchers are constrained by capital resources, and when they can afford to adopt innovations, those that are perceived to be profitable are most likely to be implemented.
Texas ranch operators’ decisions to invest in weed and brush management were investigated by Rowan and White (1994). The use of weed or brush management techniques was somewhat dependent on the rancher’s perception of the condition of the rangeland. For example, ranchers generally planned to implement brush control methods when they felt that more than 49% of their rangeland needed treatment. The degree to which the ranch family relied on ranch income also influenced implementation of vegetation management techniques. Initial cost and safety concerns were identified as barriers to adoption, and realization of increased economic returns was revealed to be a primary reason to use vegetation management practices. Perceptions of Texas County Agricultural Extension Agents about the adoption of the Brush Busters program (i.e., an extension/research brush management program) were explored in a 1999 survey (Kreuter et al. 2001:630). In general, extension agents believed that the program was adopted quickly because landowners perceived it to be “an inexpensive, convenient, safe, effective, and predictable” brush control method. The authors suggest that adoption of “ecologically sound rangeland management” practices may be enhanced with the dispersal of user-friendly information and an emphasis on short-term results.

A research effort led by Layne Coppock of Utah State University has provided significant insight to the management strategies and adoption of range management practices in Utah (Birkenfeld 1994, Peterson 1997, Coppock 1998, Coppock and Birkenfeld 1999, Peterson and Coppock 2001). Federal land permittees were surveyed in the early 1990’s, and although results revealed that losing access to public land was a major concern, the majority of the ranchers (68%) continued to use a passive
management strategy (i.e., no changes were made in ranch/range management). The active minority (32%) tended to be producers with higher levels of education and larger operations. Active management was defined as intensification (e.g., investing in water developments to increase carrying capacity), extensification (e.g., increasing the land size of the operation by purchase or lease), or on-ranch diversification (e.g., adding a fee hunting or timber harvest enterprise to the operation).

While diversification has been described as a rational way to cope with instability of the livestock market and stay in the business (Rowan and White 1994, Rowe et al. 2001), most of the ranch managers who pursued an active strategy intended to intensify the operation (Coppock and Birkenfeld 1999). This finding is not surprising when one considers the characteristics of the livestock market. Even when a market-wide decrease in cattle numbers is suggested as a strategy to increase beef prices, the most rational strategy for the individual rancher is “to increase his livestock numbers through profitable investments in range improvements or other means of increasing carrying capacity” (Workman et al. 1972:341). This strategy, according to an economic analysis by Workman et al. (1972:341), will maximize total revenue for the individual rancher “regardless of whether beef production increases or decreases at the industry level.”

Survey results from northwestern Colorado also suggest that diversification is not a popular management strategy among cattle ranchers (Rowe et al. 2001). While intensification allows the rancher to continue to focus his efforts on cattle production, diversification often involves participation in other activities, such as managing a bed-and-breakfast inn or hunting business. Because it means bringing recreationists onto the
ranchland (Rowe et al. 2001), ranchers may perceive these activities to be antithetical to the traditional ranching lifestyle, and may therefore be reluctant to consider them as management strategies. As an alternative explanation for the lack of interest in diversification, Rowe et al. (2001) propose that many ranchers may be unaware of diversification options and if they are exposed to successful diversification stories, they may be encouraged to create a new enterprise on their ranch.

In a follow-up to his original study, Coppock (1998) surveyed both federal land permittees and ranchers operating solely on private land to update information on the management strategies of Utah ranches. Results demonstrated that only 10% of Utah ranches had been actively managed throughout the 1990’s. Ranchers identified increasing age, deteriorating health, and a lack of personal income as primary reasons for passivity (Peterson 1997). Overall, only a wealthy minority with “superior risk tolerance” appeared to be investing in Utah’s private grazing lands (Peterson and Coppock 2001:106). When investment does occur among ranchers, the practices most often implemented are “less complex, clearly linked to animal production, potentially more cost-effective,” and are “compatible with operational goals” (Coppock and Birkenfeld 1999:7). In general, these findings are consistent with results of previous adoption-diffusion research.

The Sonoran Institute initiated a project to work with rural southern Utah communities to develop a niche market program for beef production (Shepard et al. 2000). The program was promoted as a way for ranchers to gain a competitive edge by marketing beef produced while improving the environmental quality of the rangeland.
Theoretically, the resulting local economic development could serve as a resource conservation strategy if ranchers were able to stay in business and rangeland development was limited. However, the outcomes illustrate the difficulties associated with encouraging ranchers to make management changes. Individuals involved with the program found that the area ranchers did not adopt the program for several reasons. First, a belief among producers that they did not control their own futures discouraged investment in a new management strategy. The adoptability of the program was further limited by characteristics of the innovation itself. Producers were not confident that the program would benefit them (i.e., the program did not have clear relative advantage), implementation of the program required a large commitment of time and capital as well as technical expertise, and adoption of the program did not produce immediate, observable results (i.e., the observability associated with the innovation was low). Finally, because the local atmosphere was characterized by hostility and polarization due to recent contentious public land issues (e.g., designation of the Grand Staircase Escalante National Monument), it was difficult for any of the ranchers to step forward and serve as the innovator or leader without being met with suspicion of other producers in the social system (Shepard et al. 2000).

Extension programs designed to provide information about and technical assistance with rangeland monitoring have been offered to Utah ranchers for many years, yet the adoption of monitoring programs has been extremely low (G.A. Rasmussen, Utah State Univ., pers. comm.). In Arizona, focus groups were conducted among ranchers and natural resource agency personnel in order to evaluate a similar rangeland monitoring
program (Fernández-Giménez and Ruyle 2002). Results provided information about rancher motivations for and barriers to monitoring. Reasons for monitoring were to improve management and relationships with agencies, increase the value of the land or ranch, and avoid legal problems or experiencing a reduction in grazing privileges. Availability of time and capital resources, complexity of the innovation, and concern that monitoring data would not be used by decision-makers or that it would be used against the rancher served as barriers to monitoring. The researchers define rangeland monitoring as a social process, and emphasize the importance of extension agents in this process, which can improve relationships between ranchers and agencies.

**Ranching Values**

Although a knowledge gap exists concerning innovation adoption among ranchers, the motivations and values of ranchers have been thoroughly explored. Ranchers and farmers operate under similar conditions, but Grigsby (1980) argues that certain values held by ranchers allow these agricultural producers to be classified as part of a unique subculture. Deeply held traditional values of ranching as a way of life greatly affect the decisions made by ranchers (Grigsby 1980, Bartlett et al. 1989).

From an economic standpoint, the decisions of ranchers, in many cases, appear to be irrational. A study in Arizona demonstrated that although net returns to investments are commonly low or negative, ranches sell for prices well above the value of their productive earning potential (Smith and Martin 1972). Saunderson (1973:8) also observed that during the 1960's the sale prices of western ranches rose "far above the values that could be soundly based upon the current and foreseeable earnings capability"
of the ranches.” Pope’s (1985) analysis of rural Texas land values revealed that consumptive demand, far more than agricultural productive potential, determined market value. These findings indicate that the motivation to purchase a ranch is not profit-maximization, but participation in the ranching way of life. Likewise, it is not unusual for ranchers to be unwilling to sell their ranches despite the potential to earn high profits from the sale.

To better understand the motivations of ranchers one must view the ranch as both a consumptive and productive unit (Smith and Martin 1972, Kearl 1975, Starrs 1998). The ranch provides consumption goods and a quality of life to the ranching household, and it is therefore valued for much more than its production outputs. In fact, ranchers have expressed the idea that these nonmonetary outputs are of greater importance than profit maximization (Smith and Martin 1972, Bartlett et al. 1989). Ranchers place a high value on the ranching lifestyle, and are therefore influenced to stay in ranching regardless of low returns (Bartlett et al. 1989).

Grigsby (1980:93) explains that formal economic theory often cannot be used to justify the decisions made by ranchers. While some ranchers adhere to a business orientation, the majority “value independence over dollars, put little value on leadership, and see ranching primarily as a way of life.” Grigsby’s (1980:95) findings led him to believe that the business-oriented ranchers are the ones that “make it” financially and “who exhibit less of the traditional values associated with the ranching sub-culture.” He suggests that these individuals are also more involved with extension agents and other organizations “which enable them to skim the top off the informational cream.”
However, the lack of adoption of some technologies among “traditional” ranchers is not simply attributable to a lack of information about the innovations. According to Grigsby (1980:95), these traditional ranchers may perceive the adoption of some technologies as a threat to the ranching lifestyle. This group of ranchers is “trading profits for lifestyle maintenance.”

Furthermore, while farmers commonly invest in capital improvements (e.g., advanced machinery) to increase production, ranchers may be more directly dependent on land productivity. This information suggests that the application of knowledge about the adoption process among farmers to the ranching community must be done with caution and on a case-by-case basis. It cannot be assumed, without further investigation, that the findings produced in agriculture fully explain innovation adoption within this unique subculture.

**Range Management Innovations**

Range management innovations include a variety of methods for managing vegetation, soil, water, wildlife, and grazing resources. Rangeland monitoring, riparian restoration or protection, brush management, and the use of herders or nutritive supplements to encourage improved distribution of livestock are examples of range management techniques that may be considered innovative. However, due to this study’s link with the CMI, active management of wildlife species (e.g., elk; *Cervus elaphus*) and the implementation of intensive rotational grazing systems were innovations of particular relevance and are reviewed below.
Wildlife Management

Diversification of the enterprise with the addition of a fee hunting operation has been proposed as a way to reduce conflict between hunters and landowners, enhance the economic sustainability of the ranch, and encourage active management of wildlife of private lands (Jordan and Workman 1989a). These enterprises are options for ranchers that want to control wildlife populations on their land but also desire some compensation for the costs associated with the production of wildlife herds (Wunderlich et al. 1990). Lacey et al. (1993) estimated that big game animals on private lands in southwestern Montana were associated with a mean cost of $6,353 per landowner. These costs are in the form of consumed forage, fence and haystack damage, and the expense of fencing haystacks. In this same region, annual profits from fee hunting operations ranged from $1,000-5,000. Of course, success of a fee hunting enterprise is dependent on the individual characteristics of the ranch and the management strategy of the rancher. Guidelines for making decisions related to fee hunting operations on private lands are provided by Benson et al. (1999).

Wunderlich et al. (1990) evaluated three types of deer (*Odocoileus* sp.) and antelope (*Antilocapra americana*) fee hunting operations in Wyoming. The enterprises were differentiated by the services provided (i.e., land access only, land access and guide service, and land access, guide service, meals, and lodging). Break-even analyses and comparisons of current fees charged demonstrated that each of the three types of operations were profitable.
Nonmonetary benefits of fee hunting have also been identified (Guynn and Schmidt 1984, Benson 1989, Lacey et al. 1993, Benson et al. 1999). In some cases, landowners have described the increased control over hunter behavior and numbers to be of greater importance than increased income when considering fee hunting operations (Guynn and Schmidt 1984, Jordan and Workman 1989a). Fee hunting provides hunters with opportunities for experiences with less crowding and better success. The addition of either a fee hunting or nonconsumptive recreation enterprise on private land offers the public a more diverse recreational and aesthetic opportunity.

According to Benson (1989), fee hunting strengthens the hunter/landowner relationship and encourages improved stewardship of wildlife (i.e., a public resource) on private lands (Benson 1989). However, a survey of Utah landowners involved in fee hunting revealed that only a minority (<25%) of respondents actively managed for wildlife on their property (Jordan and Workman 1989a). While fee hunting offers a variety of benefits to both landowners and hunters, improved management of wildlife resources may not be widespread.

**Grazing Management**

The implementation of intensive rotational grazing methods (e.g., short duration or management intensive grazing systems) has been proposed as a way for ranchers to enhance environmental quality of the rangeland, increase forage production, and increase carrying capacity (Savory and Parsons 1980). These grazing methods have been described as flexible, practical, and effective ways (Gammon 1984) to “control plant-herbivore interactions to both protect the vegetation and soils resource and to satisfy
animal requirements" (Earl and Jones 1996:347). These systems could be one way for the rancher to intensify the operation. As discussed above, intensification, which allows for an increase in herd size, is a rational management strategy for ranchers to maximize profits. According to Savory and Parsons (1980), ranchers in most areas can often expect to double the conventional stocking rate with intensive grazing systems relative to continuous grazing systems. The authors contend that this can be done without dramatically increasing the fixed cost base on the ranch, and because livestock production can be greatly improved, the investment quickly pays for itself. Thus, they dispute the assumption that only wealthy ranchers can afford to implement these methods.

If intensive rotational grazing methods can allow the rancher to increase carrying capacity, they may provide ranchers with a way to intensify the operation in an environmentally sustainable way and one that is compatible with the ranching lifestyle. However, the extent to which the previously described benefits are clearly results of the adoption of an intensive grazing system is a controversial subject among grazing researchers. Although practitioners of such systems have been able to increase stocking rate in some instances, Bryant et al. (1989) conclude that ranchers can realize similar benefits by using traditional range management techniques (e.g., brush management and water distribution) and the cost and managerial inputs associated with adoption of an intensive grazing system are therefore not justified. Despite the potential ability to increase stocking rate as well as profitability, "managerial commitment [required to maintain an intensive grazing system] is profound" (Malechek and Dwyer 1983:34).
Additionally, an economic assessment conducted by Wilson et al. (1987) demonstrates that adoption of an intensive rotational grazing system without the simultaneous adoption of other management practices (e.g., increased monitoring for disease and reproduction problems and improve record keeping) may be unlikely to enhance the producer's long-term economic situation. These ideas illustrate the importance of management effectiveness in determining the success of an intensive grazing system (Wilson et al. 1987). Experience has shown that adoption of these systems by inexperienced ranchers can produce disastrous consequences for the land as well as the rancher's profitability (Bryant et al. 1989).

The adoptability of such grazing systems has not been well researched, but potential explanations for the reluctance to adopt have been proposed. The necessary labor commitment may be unappealing to ranchers used to a less management intensive lifestyle afforded by extensive systems, and the potential to observe immediate improvement on the land (especially in arid areas) is low (Malechek and Dwyer 1983). Because solid answers to questions of how these grazing systems work in certain areas have not been provided to producers, uncertainty associated with adoption is increased. Meanwhile, Bransby (1989) explains that while the outcomes of grazing research efforts are intended to ultimately benefit the livestock producer, grazing researchers have become focused on biological considerations to the exclusion of producer needs.

**Holistic Management**

Both of the innovations described above can be adopted as part of the Holistic Management/Holistic Resource Management (HRM) approach promoted by Allan
Savory (Savory and Butterfield 1999). The HRM approach encourages agricultural producers to manage ecosystem processes and protect or improve biodiversity (Stinner et al. 1997). Although adoption of this management approach has been "seemingly slow," ranchers that have used it have experienced positive results (Montagne and Orchard 2000:7). A survey of Northern Rocky Mountain ranchers revealed increased profits, stocking rates and densities, more active wildlife management and range monitoring, dedicated financial planning, and an enhanced quality of life associated with HRM (Montagne and Orchard 2000:5). Holistic managers face certain challenges in the implementation of this process (e.g., time requirements and interpretation of biological monitoring results), yet the vast majority (95%) of the surveyed Holistic managers indicated that they are "highly motivated" to continue using the approach.

Stinner et al. (1997) conducted qualitative interviews of 25 farmers and ranchers who were identified as being committed to using HRM throughout the United States. After adoption of HRM, the percentage of producers who thought biodiversity was essential to the sustainability of the operation increased from 9% to 100%. The majority of respondents (80%) experienced an increase in profitability, and many reported a decrease in the amount of labor required to run the operation even though extra time was devoted to planning and monitoring. Very few HRM practitioners (< 5%) adopted a formal monitoring system, which is promoted as part of the HRM approach, but all respondents perceived improvement in ecosystem processes on their land. The finding that most respondents reported "that they were considered odd by their immediate neighbors" illustrates the response of the local social system to HRM adoption (Stinner et
al. 1997:206). The researchers conclude that adoption of HRM may be slow because of
the time lag that occurs before observable results are produced, a reluctance among
agricultural producers to commit to increased planning and monitoring, and especially the
paradigm shift required to make the change.

**Implications for Current Study**

The literature reviewed here provides insight for exploring innovation adoption
among livestock producers in Utah. The basic adoption-diffusion framework developed
by Rogers (1995) and enhanced by researchers who have studied adoption among
agricultural producers and on rangelands is useful for guiding further study of adoption
among ranchers. For instance, it can be expected that characteristics of the individual,
innovation, and social system will influence innovation. Because agricultural producers
face constraints that stem from market instability, societal demands, and environmental
conditions, one would also expect that the risk associated with adoption of new
management practices would be especially high for ranchers experiencing low returns
from livestock production. However, because information about the values associated
with ranching suggests that ranchers can be considered a unique subculture within the
larger category of agricultural producers, it cannot be assumed that the existing
theoretical framework is completely applicable to ranching.
CHAPTER III

METHODS

Research Objectives

The primary objectives for this research were as follows:

1. To identify characteristics of people who are known to be among Utah's most innovative livestock producers.

2. To identify barriers to and motivations for innovation adoption on Utah rangelands.

3. To identify the preferred information sources of the livestock producers about innovations.

Research Design

Existing innovation adoption theory provides a useful framework for exploring the adoption process among ranchers. However, because the extent to which existing theory can be applied to ranching is unclear, a qualitative research approach was utilized for this study. Research that does not produce findings through statistical analysis or any other means of quantification is considered qualitative (Strauss and Corbin 1990). Qualitative research is valuable for (1) discovering and understanding aspects of any phenomenon about which little is known, (2) providing a different view on things that have been the focus of a fair amount of past research, and (3) revealing rich details that are difficult to uncover through quantitative methods. In the case of the current study, quite a bit is known about innovation adoption in general, but not specifically among
ranchers, and very little of this research has given ranchers the opportunity to discuss their experiences with the adoption process in their own words.

Ideas from grounded theory were used to guide this study. Grounded theory (Glaser and Strauss 1967) is an inductive approach through which the researcher begins with observations and then identifies patterns. Although the researcher may have preconceived ideas about what will be found, formal hypotheses are not formed. According to Babbie (1999:261), this kind of an approach “allows a greater latitude for discovering the unexpected.” The purpose of grounded theory is to identify conceptual categories or elements of categories (i.e., properties) that can make an existing theory more robust, not to disprove theory (Glaser and Strauss 1967). Ideas from grounded theory were useful for making this research an exploratory process appropriate for discovering aspects of innovation adoption within the ranching community that had not yet surfaced. Using this approach, existing theory may be simultaneously verified and expanded.

A weakness of qualitative research is the potential for a study to be conducted without a clear focus (Miles 1983). Because openness and flexibility characterize a qualitative approach (Strauss and Corbin 1990), the researcher may modify the research process as new information is encountered. Therefore, use of the theoretical framework provided by Rogers (1995) and others who have studied innovation adoption among ranchers (see Literature Review) was essential for maintaining a clear research focus as the research process evolved over time.
Phase I: Key Informant Interviews

Data Collection for Phase I

Informal qualitative interviews were conducted with key informants in Spring 2001. The respondents included Utah State University (USU) Extension agents, NRCS employees, and livestock producers who were identified as being actively involved in the ranching community (e.g., chair of the local Soil Conservation District). The overall goal of the interviews was to allow the respondents to express their personal perceptions about changes Utah ranchers were making or were interested in making to their operations. Reluctance to adopt and producer motivations for adopting new practices were also discussed. An interview protocol was developed (see Appendix A), and a strong effort was made to keep the interviews informal and conversational with the use of open-ended questions. Generally, the researcher provided respondents with a description of the study, explained the anticipated difficulties associated with conducting the research (i.e., identifying ranchers who had adopted innovations relevant to the study), and asked the respondent to share relevant ideas and experiences. Thirteen interviews were conducted either by phone or in person, and interview length ranged from 15 minutes to 1 hour. Because these interviews were exploratory and their purpose was only to discover information to guide the primary research phase, an in-depth analysis of the data was not conducted. Interview notes were reviewed and summarized, and the researcher compared the data to the existing innovation adoption literature.

Particularly relevant for determining the most appropriate way to proceed with this study was information encountered about the widespread lack of adoption of range
management practices in Utah (see Results for details). Respondents revealed that adoption of intensive rotational grazing systems (a CMI innovation) was especially low. Furthermore, respondents felt that a fatalistic attitude about the future of ranching was dominant within the ranching community and served as a barrier to innovation.

**Phase II: Rancher Interviews**

Given the above information, a quantitative study of a random sample of Utah ranch operators would have been unlikely to capture a statistically viable data set of innovators. Because innovative ranchers are a minority in Utah, a random sample from the state’s ranching population would likely omit the few innovators/early adopters. Accordingly, it was determined that in-depth interviews of Utah’s most innovative ranchers would best fulfill the research objectives. Innovative ranchers were determined to be appropriate respondents because they are familiar with the adoption process as well as barriers to adoption. Because information from the preliminary interviews (see Results: Phase I) suggested that innovation was limited by the high degree of fatalism within the state’s ranching community, there was a desire to focus on innovative ranchers who continued to invest in making changes to their operations. By doing so, more information would be gathered about what makes these producers unique within a social system characterized by uncertainty. The researcher also felt that this approach would be valuable in understanding the adoption process more fully because it would allow ranchers to express their thoughts in their own words. This process can result in the discovery of information that would otherwise remain hidden.
The Study Innovations

Because CMI researchers are currently studying domestic livestock grazing and wildlife/livestock interactions on private rangelands, innovations such as fee hunting enterprises and intensive rotational grazing systems were particularly relevant to this study. However, results from preliminary interviews of ranchers and range professionals indicated that adoption rates for intensive rotational grazing systems are low in Utah (see Results: Phase I). Fee hunting, in contrast, is “an established tradition among native Utah landowners” (Jordan and Workman 1989b:252) and may not necessarily qualify as an innovation. Although some landowners participating in the state’s cooperative program for management of fee hunting are implementing range and habitat improvements and could be called active or even innovative managers, others are only passive participants (T. Messmer, Utah State Univ., pers. comm.). In light of these complications and in order to evaluate a large and diverse enough sample of innovators and early adopters, it was necessary to expand the boundaries of the study to include other land-based innovations. Examples of these innovations include rangeland reseeding, riparian zone rehabilitation, rangeland monitoring, and forest management. The study was limited to innovations that enhance both the economic and environmental sustainability of Utah’s ranches.

Respondent Selection

A list of the state’s most innovative producers was built by asking natural resource professionals and ranching organizations to provide names of livestock producers who were known in the ranching community for progressive management.
Letters describing the study and asking for names of ranchers were sent to the NRCS state office, Utah Farm Bureau Federation, USU Extension Agents, and the Utah chapter of the National Cattlemen’s Beef Association (see Appendix B). The different groups were consulted in an effort to reduce selection bias. Thirty-four names were collected and appropriate cases (i.e., respondents) were selected from the list.

**Case Selection Criteria**

The cases selected for this study were rural Utah ranchers who can be classified as innovators or early adopters. As explained by Rogers (1995), these are the individuals in the social system (i.e., the rural Utah ranching community) who adopt new practices quickly relative to others in the system. In short, ranchers appropriate for selection were those who had (1) implemented range improvements that were intended to enhance both the economic and environmental sustainability of the ranch and (2) implemented innovations that differ from the local norm.

Innovation can exist at the industry level or individual level. For the purposes of this research, an innovation was defined as a range management practice that was perceived as new to the individual producer and was not considered to be the local norm at the time it was implemented. Animal science innovations, such as crossbreeding or the use of a new vaccine, do not qualify as range management. Furthermore, a producer who was continuing to use traditional range management practices such as reducing woody vegetation to increase forage production was not considered to be innovating. If the rancher was working for the first time and was one of the first in the local community to reverse the effects of overgrazing by removing woody vegetation and restoring
herbaceous cover, his management was considered innovative. As another example, ranchers participating in Utah’s Cooperative Wildlife Management Unit (CWMU) program simply to earn additional profit without active habitat management were not considered an appropriate selection for this study, while those that were actively managing wildlife resources were potential interviewees.

**Data Collection for Phase II**

In-depth interviews were conducted among a sample of ranchers in Fall/Winter 2001-02. Each rancher for whom contact information could be found was sent a letter describing the study and informing him (no female ranchers were identified) that a researcher would be contacting him by phone (see Appendix C). When contact by phone was made, the researcher first asked the producer if he would be willing to participate in an in-depth personal interview at a location of the producer’s choice. Ranchers who agreed to participate were then asked to briefly describe some of the changes they had made to their operations. If a rancher had used innovations that qualified for this study, he was asked to set up an appointment for a face-to-face interview with the researcher to further discuss his use of range management innovations.

The in-depth interviews were focused, meaning that the adoption-diffusion theoretical framework (see Research Design) was used to develop an interview protocol (see Appendix D). Although guided by an interview protocol, focused interviews consist largely of open-ended questions and maintain a conversational tone (Yin 1994). This interview style was useful for the qualitative approach outlined for this study. The interviews were also semi-structured and questions were not asked in the same order or in
the same way for every interviewee. This was done in order to keep the interviews conversational and encourage the discovery of unanticipated information.

During the interviews, respondents were asked to describe the changes they had made and their motivations for doing so. In accordance with a recommendation from Dewees and Hawkes (1988), personal characteristics of the rancher (e.g., age, risk tolerance, and motivations), structural characteristics of the ranch (e.g., acreage and herd size), characteristics of the social system (i.e., the local ranching community), and attributes of the innovations (e.g., complexity and compatibility) were explored as variables influencing adoption. Barriers to adoption and ranchers’ preferred information sources were also discussed.

Although most producers who were contacted agreed to participate in the study, a few declined because they did not have the time or had gotten out of the livestock business. The researcher’s goal was to reach “saturation” or to continue interviewing until new information was no longer being provided by respondents (Glaser and Strauss 1967:61). Fifteen interviews were conducted among cattle and sheep ranchers, meaning that 44% of the innovators identified through the sampling process were included in the study. Saturation was reached within the sample being interviewed (i.e., innovative ranchers). Glaser and Strauss (1967:30) note that the number of cases is not “crucial” because information provided by one case can be enough to generate a new concept (see Data Analysis for details). On average, interviews lasted approximately 1 hour, but interview length ranged from 45 minutes to 4 hours.
Research Expectations

Formal hypotheses were not developed prior to the in-depth interviews in an effort to prevent the researcher from focusing on testing preconceived ideas rather than encouraging the discovery of unexpected information. However, review of the literature and preliminary interviews of ranchers and range professionals (see Results: Phase I) provided some insight to what could be expected. In general, it was expected that innovators/early adopters in the rural Utah ranching community would likely be operators of larger operations. Contact with extension agents and membership in ranching organizations was expected to be associated with innovation adoption, especially due to the sampling process utilized. The producers were expected to have prominent land stewardship and ranching lifestyle values. Finally, the unique settlement pattern of the state of Utah where ranchers are more likely to live in town than elsewhere in the West, was expected to have a strong influence on the adoption of management intensive practices.

Data Analysis

Data collected during the in-depth interviews were qualitatively analyzed. Because methods for qualitative data analysis have not been well defined (Patton 1980, Miles 1983, Yin 1994), the task depends largely on the individual researcher’s style of “rigorous thinking, along with the sufficient presentation of evidence and careful consideration of alternative interpretations” (Yin 1994:99). The purpose of analysis is to
organize the data into patterns or categories for description, while interpretation involves providing a perspective on the meaning of the data (Patton 1980).

Data reduction was the first analytic technique used. According to Miles (1983: 122), because qualitative data collection usually results in lengthy, unorganized documents, "there is a strong need to establish meaning in a systematic way." Data reduction is a type of preliminary analysis, which allows data to be coded by category and major theme. The researcher is able to maintain the research focus and organize data so that it is more manageable for cross-case analyses.

This study has both explanatory and exploratory elements. Relevant innovation adoption theory already exists, and one goal of the study was to better explain the factors that influence innovation adoption. The "explanation-building" process, described by Yin (1994: 107) was useful for this purpose. The data were organized and compared to a theoretical proposition, and the theoretical proposition was revised as necessary. Each time this process was repeated, the data were examined from the new perspective provided by the revised theoretical proposition. This strategy is a type of pattern-matching, which is a method for comparing "an empirically based pattern with a predicted one" (Yin 1994: 103). Because this study was guided by the theoretical framework provided by Rogers (1995), other innovation adoption researchers, and the results of the preliminary interviews, the use of pattern-matching as an analysis tool was logical. For this part of the analysis, data were compared across cases.

A qualitative approach was used for this study because the researcher felt that the existing innovation adoption theory was not completely relevant to ranching. Thus, the
research design contained an exploratory element in an effort to allow the discovery of new conceptual categories or properties, which can be added to existing theory.

"Comparative analysis," described by Glaser and Strauss (1967:21), was the most appropriate analysis technique for data collected in an exploratory fashion. The technique is similar to explanation-building, however, it is used for hypothesis-generating or to "develop ideas for further study" (Yin 1994:107). Again, data were compared across cases, but information provided by a single respondent can be enough to generate a new concept (Glaser and Strauss 1967). The comparative analysis process is valuable for description as well as providing a more relevant theory for future research.

The specific analytic process used for this study was a combination of the explanation-building process and the constant comparative process. The primary goals of analysis were to: (1) provide a description of innovation adoption among livestock producers, (2) provide an explanation of why producers adopt innovations or why they do not adopt innovations, and (3) generate ideas about innovation adoption among ranchers that can be added to the existing theory and guide future research. The data were first organized and reduced as the researcher began to code data into categories. For example, two major categories used in this study were motivations for and barriers to adoption. The data were then recoded into different categories, for example, personal characteristics of the adopter and characteristics of the innovation. Once data were coded into a category, elements of categories were defined. To illustrate, an element of the barriers to adoption category would be availability of resources.
This process allowed the researcher to determine the extent to which the data fit into the conceptual categories provided by existing theory. Data that did not fit into existing conceptual categories were studied, and ideas for new categories and elements were developed. Data were then recoded as the researcher determined the usefulness of the revised framework.

An important concept to be discussed at this point is the distinction between “truth” and “useful information” (Patton 1980:273). Data provided by respondents represent perspectives of livestock producers, and the researcher’s goal is not to determine the accuracy of the information, but to provide useful information to researchers and change agents. Glaser and Strauss (1967) address this issue by explaining that the absolute accuracy of evidence collected by the researcher may not be able to be determined, but is valuable for generating a concept. Facts are then primarily useful for illustrating the concept, and as facts may change over time, the concept still exists and will remain to be functional. Likewise, interpretations provided by the researcher are intended to provide a perspective that may be useful to others exploring innovation adoption among ranchers.
CHAPTER IV

RESULTS AND DISCUSSION

Phase I: Key Informant Interviews

The primary purpose of the key informant interviews was to gather information that would be useful for determining the most appropriate way to conduct the second research phase (see Methods). Due to the link with CMI, the interviews were intended to reveal information about CMI innovations in particular. Because respondents reported low adoption rates for CMI innovations and that innovation of any kind was rare in Utah, the interviews focused mainly on barriers to innovation. The interviews revealed some information about the use of range management innovations and motivations for innovation. Most of the respondents were convinced that innovation was impeded by a high degree of fatalism (i.e., an attitude that they would not be able to maintain the ranch because of financial difficulties, societal pressures, or environmental conditions) among livestock producers who are struggling to maintain their livelihoods. Therefore, discussion about adoption of range management innovations was limited.

When one considers the "common assumptions" about adoption of innovations, it is apparent that it is difficult to categorize individuals as innovative. This may explain why respondents of these interviews did not perceive many Utah ranchers to be innovators. Sharp (2001:17) identified three such assumptions that are not necessarily valid. First, researchers and extension personnel often assume that the adoption path is unilinear. This means that when a specific innovation is considered, the researcher
assumes that all adopters implement the innovation for the same reason and follow the same path to adoption (i.e., individuals receive information about the innovation, change their attitudes toward the innovation, and make logical decisions to adopt or not adopt).

The primary problems with this assumption are that not all ranchers face similar problems (and therefore should be expected to respond differently) and that there is more than one logical solution to the same problem. A second common assumption is that innovations are relatively “homogenous or interchangeable” (Sharp 2001:18).

Innovations promoted by the scientific community are assumed to be beneficial for the individuals, and when non-adoption occurs, it is assumed that the individual lacks education or other skills. Again, ranchers have different problems and values and should be expected to select different practices that best suit their needs. For example, while one rancher may be most interested in improving profitability and will adopt innovations that are clearly economically advantageous, another rancher may be most interested in reducing labor so that he/she can spend more time with his/her family. In this case, the individual’s choice to not adopt does not mean the individual is not innovative. The individual may in fact be likely to adopt an innovation more suited to his/her needs.

Finally, researchers assume that innovations are rigid (i.e., they have fixed characteristics) (Sharp 2001). This can be problematic because while a rancher may need to adapt an innovation so that it works on his unique ranch, a researcher may consider anything less than full and proper adoption of a practice to be nonadoption (for more information about rigidity see Conclusion and Implications). For these reasons, it can be
difficult to say that one is innovative because the individual has adopted a specific innovation and has implemented it in the way recommended by professionals.

**Use of Innovations**

In general, interviews revealed that few producers were adopting innovations. Fencing, water developments, and brush management were the primary innovations being used by Utah producers. Respondents expressed an opinion that rangeland monitoring and intensive rotational grazing systems were rarely implemented and that ranchers prefer innovations that are easy to use, simple, inexpensive, and produce immediate results.

**Barriers to Adoption**

Not surprisingly due to similar findings from previous research (Peterson 1997, Peterson and Coppock 2001), a lack of time and money to invest in improvements and advancing age were commonly cited as reasons for nonadoption. According to respondents, a strong commitment to the traditional ranching lifestyle often serves as a barrier to innovation. This idea is supported by Grigsby’s (1980) findings, which suggest that ranchers will not participate in certain activities (e.g., collaboration and innovation adoption) due to the perception that participation is incompatible with the ranching way of life. The effect of Utah’s settlement pattern was also defined as a barrier to adoption. Many of the state’s ranchers have homes in town instead of on the ranch, making management-intensive changes (e.g., intensive rotational grazing systems) difficult to implement. This is especially true when ranchers experiencing low returns from
livestock production must hold a full-time job in town. Many respondents believed that low profitability of ranching and development pressure would force a large number of ranchers out of business and that the related uncertainty about the future of the operation among producers is a barrier to innovation. A related sentiment expressed by one livestock producer was that investment in improvements on federal land is too risky because of the uncertainty associated with operating on public lands.

Diversification of the enterprise was discussed with several of the respondents. In addition to the barriers listed above, respondents explained that livestock producers are reluctant to diversify because (1) they are concerned about the liability and hassle connected with dealing with the public, (2) they anticipate problems associated with partnering with adjacent landowners to establish hunting businesses (e.g., partners allowing friends and family members to hunt for free), and/or (3) the location of the operation can limit diversification opportunities (e.g., ranchland is impacted by heavy ungulate use in the spring, but the animals are not present during the hunting season).

**Motivations for Adoption**

Motivations for adopting range management innovations were discussed less thoroughly due to the prevailing belief that so few producers adopted new practices. When adoption did occur, innovations were implemented to increase production and profitability and improve wildlife, forage, soil, and water resources. One producer also explained that he uses innovative management practices to demonstrate the benefit to other area producers. Some range professionals commented that ranchers only adopt
practices such as rangeland monitoring when there is a perceived need to defend their management (i.e., in response to a potential threat).

Phase II: Rancher Interviews

Respondents

Because of the nature of this research, there necessarily was no attempt to select a representative sample of Utah ranchers. For this reason it is important for the reader to be able to understand how the respondents from this study can be categorized as a subgroup within the larger rancher population. Coppock and Birkenfeld (1999:10) conducted an assessment of the socioeconomic diversity among Utah ranchers. The researchers were able to identify five, distinct socioeconomic groups of public land permittees in the state. These groups were found to have different "resources, goals, and vulnerability to changes in federal land policy," and the researchers suggest that by focusing on coping strategies, operation scale, and production goals, one can gain insight about a particular ranch operator’s ability and motives for adopting range management practices.

The respondents from this study most likely belong to the group Coppock and Birkenfeld (1999:10) called "ranchers." In general, this category differed from "barons" and "hobbyists" because they were reliant on income from livestock production, dependent on family labor, ran medium-sized operations, and were characterized by traditional ranching values. The group was further divided into "public ranchers" and "private ranchers" according to the extent to which the operation was dependent on
public grazing resources. In 1999, “ranchers” represented approximately 35% of the permittees in Utah (Coppock and Birkenfeld 1999).

Although this study did not collect all the data Coppock and Birkenfeld (1999) used to categorize livestock producers, the respondents shared several characteristics with the “rancher” subgroup: They were largely dependent on ranch income and family labor, and expressed traditional ranching values (see next two sections). “Ranchers” are an important group for range professionals to work with because they are a large enough group to have a significant impact on Utah’s rangelands, and traditional enough to be seen as opinion leaders (i.e., members of the social system that are respected by other members and have an informal influence on the attitudes and behaviors of the others) by other members of the ranching community.

**Motivations for Adoption**

Much of the information collected during the in-depth interviews was compatible with results of the preliminary interviews and previous research. Motivations for implementing range management innovations were discussed, and even though few of the findings were unexpected, rich detail was provided by interview respondents that was previously unavailable. These details allow for a deeper understanding of why certain producers choose to adopt innovations.

Improving profitability/productivity and conserving natural resources were identified as the primary reasons for these ranchers to invest in innovation. These motivations were often cited as if they were one in the same, which is reasonable considering that a ranch cannot likely be sustained over the long-term if forage, soil, and
water resources are severely degraded. As was expected, ranchers expressed strong
ranching lifestyle values and wanted to improve the operation in order to maintain their
livelihoods. For example:

 Because it’s an improvement in your future. If you don’t improve, you fall
behind, whether it be with genetics or range improvement. ... You can’t be short-
sighted, you have to look to the future and invest what you can in the future.
...those that don’t take care of the land are terminal. If I don’t graze responsibly,
the quality of the land will degrade. ... If you’re going to survive in the cattle
business, you’ve got to improve what you’ve got. ...[I believe] what we’re doing
is good for the rancher, good for wildlife, and good for the environment.

Well, the primary reason is to increase productivity. Although the erosion was
really, still to increase productivity, but we were losing our water. It was running
down a real deep gully instead of soaking in when the snowmelts, instead of being
spread out over the surface so that it could re-charge the groundwater or provide
water for the roots of the grass later in the year. It’s just gone. So, even that,
even though it’s erosion control, it still comes back to productivity.

At the same time, land stewardship values (also predicted in the informal
hypotheses) were described, and interviewees explained that certain innovations were
used solely for conservation purposes, even when costs associated with these innovations
were not expected to be recovered. These remarks from producers who were asked to

described their primary reasons for using improvements, illustrate these ideas:

 Well to start with, we wanted to make our land productive. ...we’d lost so
much productivity. We wondered whether the ground was worth even keeping.
And if we couldn’t make it produce something, why we’d just have to sell it to
someone and forget it. And that’s when we went in and started doing the
chaining, and fires and reseeding. So first of all, that was our motivation-to make
the ground productive enough that we could justify owning it. But as time’s gone
on and we’ve seen the benefit to the watershed, I think that’s what’s really, on the
long-haul, going to be the most beneficial to everyone. And it probably thrills me
more to see the benefit we’re receiving to the watershed...

For conservation, conservation of the natural resources, of the grasses and the
land and [for] erosion. And you know, the bottom line for all of us is economics,
if it’s going to make you any money or if it isn’t. Most of these projects, of
course they cost you money in the beginning, but you hope the payoff's down the road.... ...And most of these improvements make it better for the cattle, too. ... Most of [the improvements payoff]; some of them are for the name of conservation only. ... They end up costing me money. ...some of it you do because you know it's good for the land and good conservation. ...you're saving topsoil and resources ... [the improvements] cost you money, but in the long-haul, it's improvement on the land.

As revealed during the key informant interviews, some livestock producers seemed to be motivated to innovate in response to a potential threat. The interviewees did not express concerns that they had been improperly managing the land; rather they were aware of things that needed to be pro-actively addressed so that a problem would not arise (e.g., involvement in collaborative efforts to manage sensitive species). In these situations the innovative action is in response to a threat, but conservation and lifestyle maintenance are still influencing factors. Grigsby (1980) suggests that the more traditional, lifestyle-oriented ranchers reject collaborative efforts and innovation adoption because these things interfere with ranching values. However, involvement in these kinds of things may be more common in today's changing socio-political environment, even among ranchers who possess strong ranching lifestyle values. These days many ranchers are struggling to survive in the livestock industry, and they may not only trade profit for lifestyle maintenance as Grigsby (1980) noted, but may also be adapting in other ways in an effort to continue ranching.

I think the thing with monitoring and the population of people considering petitioning for [sage grouse] to be an endangered species, and I knew that if it was [listed] it would be a real hardship on me. And I thought, 'well, I wish I could be involved in the process.' That's actually what it boils down to. Plus, to be involved and maybe direct some of the money to projects that can not only benefit the group and help our committee, [but] help the livestock out there. So, I'd really like to stay in business.
Other motivations for improvement were not described in the preliminary interviews. Respondents said that they wanted to implement improvements in order to demonstrate good land stewardship to the public. Managing with the public’s opinion in mind is also related to lifestyle maintenance and response to a potential threat.

I think if we can maintain and show that we’re taking very good care of the range, and these improvements are enhancing the range, that we can say, ‘look, we’re being good stewards here. We’re not only making it good for us and our cows, it’s making it good for deer, wildlife, and overall, everybody benefits.’ …I don’t see the incentive for not doing anything as far as enhancement. The more you can do to help maintain the rangeland just adds to your side of the equation to keep you out there.

I felt like, by doing what we did, rebuilding fences and putting a lot of let-down fences in, by managing these kinds of things, that’s how you make it work good for everybody. People riding around sight-seeing don’t see so many troubles if you manage the ground properly. … To keep peace with everybody, you’d better keep cattle away from the streams as much as you can. That’s all people see.

Additionally, ranchers mentioned that maintaining good relationships with natural resource management agencies was a reason to implement certain improvements. If producers make an effort to show that they are properly managing the land, they may be less likely to experience negative effects, such as social pressures to reduce grazing on public lands. Furthermore, producers seemed proud of their conservation efforts, and wanted the public to be more aware that livestock producers are concerned with taking care of the environment.

I don’t know how much truth there is to this, but I’ve been told that [the Forest Service] use[s] [the area our allotment is in] as a showplace. So, the governor or somebody wanting to see the forest or what the ecosystem’s doing, they take them up there. …if you put salt up on hills or places where cattle usually won’t go, they’ll trail to there for the salt and that helps disperse them, too. …that makes quite a bit of difference. …instead of cows bunching up in the meadows where people don’t like to see them, especially on public ground, it’s really an eyesore. That helps keep them scattered out and away from the main road.
The land stewardship and ranching lifestyle values expressed by interviewees are linked to each motivation for innovation. These ranchers are strongly committed to ranching (see next section), and are motivated to sustain their operations by enhancing profitability and natural resources. Likewise, the respondents stay aware of potential threats to their livelihoods, and actively seek opportunities to become involved in processes that will reduce these dangers. Among innovative ranchers, building non-adversarial relationships with natural resource agency personnel and demonstrating good stewardship to the public may have become lifestyle maintenance activities.

**Personal Characteristics of Innovative Utah Ranchers**

Exploration of personal characteristics of the respondents offers insight as to why these particular producers continue to invest in innovation while many other producers in the state do not. The ranchers interviewed were full-time ranchers with few off-ranch obligations.

I’m here full-time … and I probably put in 60 hour weeks easy enough. …and I don’t have a part-time job or anything like that, so I devote all my time to what I’m doing here.

Obviously, ranchers who work full-time on the ranch and do not have part-time jobs in town are going to have more time to devote to making changes to the operation.

For the most part, interviewees were multi-generation ranchers.

Our ranching operation actually was homesteaded and began in the late 1800’s. …and so, it’s been in our family since then.

I’m the 6th generation running cattle here in southern Utah. So, [the ranch has] been in the family for a long time.
These ranchers are dedicated to sustaining ranches that have been in the family for several generations and are therefore motivated to innovate. Similarly, each respondent demonstrated a strong commitment to ranching for the rest of his life, and most expected the ranch to continue for at least one more generation.

I guess just because [the ranch has] been in the family so long, I can’t see anything but it remaining in the family to operate in at least some form as a ranch. ...I’m fairly confident that it will stay in the ranching business ... it may be a dude ranch or something different than it is now, but we’ll still be on the land ... at least for another generation.

Well, the way I feel is that this agriculture’s an incurable disease. ... So, we’re in it for the long haul, and that’s all we know and all we want to do. And so, anything that we can, we’re going to continue to improve our range and our ground and property.

I love our ranch. I love our operation and I love our cows. ... ...we want to maintain our livelihood. .... ...we’re not making decisions on this ranch for 5 years or 10 years, we’re making decisions for 100 years. The decisions we make we want to carry and be long-term decisions, not short-term decisions. If [our sons don’t take over the ranch], somebody will. But we feel pretty confident that these boys will do it.

This finding was not surprising; one of the research expectations was that the innovative ranchers would have strong ranching lifestyle values. The fact that these producers are so dedicated to the continuation of the ranch may explain why they are more willing to invest in improvements that do not produce immediate results than someone who possesses a fatalistic attitude and feels that the ranch will be sold and subdivided in a few years.

Respondents also demonstrated that they have large social networks and actively seek information about range management. All interviewees reported membership in
ranching organizations (e.g., the Utah Chapters of the National Cattlemen’s Beef Association and Utah Farm Bureau Federation).

There are a lot of contacts we’ve made through the National Cattlemen’s, you know, people from all over the country ... you get a lot of ideas that way.

And when I say neighbors, I don’t mean just across the fence ... we’re talking 50, 100, 500 miles away!

[Working as a fieldman for a livestock lending bank] was very interesting. It was a great job because it was loaning money to ranching operations, some of them scattered into Colorado, Arizona, and New Mexico.... I was a fieldman and started getting through different areas of the state. Working for the bank was when I started seeing what was happening on some of these other rangelands and I got to talking to people about it and that’s where I kind of got the idea.

Frequent interaction with University Extension was also a universal characteristic of interviewees, as was expected. Ranchers who interact with people outside the local community are more likely to be exposed to new ideas and may consider a broader range of people to be their peers.

I talked to the Extension people up there at Utah State University. ... I did a lot of reading and learned a lot of different things. I spent at least a year finding all the information I could about [forest management], and then I decided I was in a position to make some decisions.

Well, we do a lot of consulting with the county agent. ... You can get a lot of ideas from different people on different ways to do things. ... But, I think the biggest thing you can do is use the universities and all of these agencies that are there to help you if you’re willing.

Due to these interactions, these ranchers may be more comfortable trying new things than producers who are not commonly exposed to innovative ideas and people. In addition, Rogers’ (1995) hypothesis that innovations with high levels of observability are more likely to be adopted is supported by these findings. Because ranchers can observe the
outcomes produced when others implement innovations, risk associated with adoption is decreased.

That’s why I’m in agriculture, I like to try different things!

We didn’t feel that there was any risk as far as what the results [of prescribed fire] would be. I had so much confidence in what [the USU Extension Agent] was telling us he could do, I wasn’t concerned about it.

[W]e weren’t convinced [Short Duration Grazing] would work in this dry climate for a long time, but we’ve talked to enough people who have tried it now that … I feel pretty certain it works.

If there’s a way to improve things and make it better, you’d better do it. And I suppose that’s how we’ve hung in. … We feel confident enough that what we’re going to do will work.

While respondents made statements that illustrated their willingness to innovate, some of these ranchers did not perceive themselves to be risk-tolerant. Several producers emphasized that they did not want to invest in innovation unless they were fairly certain desired results would be produced. Two alternatives help to explain this finding; (1) these ranchers may be capable of tolerating risk, but do not have self-perceptions of being risk-tolerant, and (2) some of the respondents are early adopters within Utah’s ranching community rather than innovators. Peterson and Coppock’s (2001) suggestion that the innovative minority of Utah ranchers possesses a high risk tolerance may be correct, but difficult to corroborate because innovators may be reluctant to categorize themselves as risk-takers.

I try to keep myself aware of what’s out there, but if it’s going to cost me anything, generally I like for someone else to be the guinea pig first and see if it works.

I like to think we’re pretty progressive here … I’m not going to stick my neck
out on something and lose a bunch of money. We’ve been sort of conservative on that type-stuff….

Actually, we usually think about stuff for years before we try it. I’m not a risk-taker. We’re open to looking at doing things, but we usually study it long enough to make sure it’s going to work before we try it. …[W]e will try new things, but they have to be kind of proven before we try it.

You know, I’m a really conservative person. It’s just like with this hunting thing...I just kind of mull it around and talk about it and you know, read things until...I’ve almost experienced it before I’ve tried it. …I really won’t try something until I’m pretty confident it’s going to fit and it’s going to work.

On-ranch residence was another characteristic that appeared to influence adoption among the innovative ranchers. As was previously mentioned, many ranchers in the state of Utah do not live on the ranch and it is therefore difficult for them to implement management intensive practices (see Results and Discussion: Phase I). Most respondents of the in-depth interviews, in contrast, live on or very near (i.e., within 10 miles) the base property.

That’s the nice part of our operation here. Everything we’ve got is within 6 or 7 miles of home. …it’s very convenient and that’s why I can run it alone.

The base property where we start on our winter range is about, probably 3 and a half miles. And so, we don’t truck anything except lambs to market and calves to the market. …And then the spring, summer, and fall and winter range are all adjacent, adjoining. That’s really convenient. …we’re pretty close to our base property, and that’s nice.

Ranchers who do not have to devote a large amount of time traveling to and from the ranch each day have more time to innovate. Some of the ranchers who do not live on the ranch have other family members living on the property and live on the ranch themselves part-time (e.g., during the summer and/or on weekends), and the fact that each of these ranchers was a full-time rancher may explain how they are still able to implement
improvements despite off-ranch residence. Even so, difficulties associated with having less time to work because of time spent commuting to and from the ranch were described.

I kind of commute back and forth, but on the weekends and during the summer, we live up there. [Living off the ranch] adds a lot of travel time. It’s about an hour drive … . I spend a lot of time driving on the road when I could be working and getting something done.

Little evidence was found to support the research expectation that innovative ranchers would be operators of large ranches. Previous research has shown that operators of large operations are more likely to adopt innovations than operators of small operations (Lacey et al. 1985, Coppock and Birkenfeld 1999), and researchers have suggested that this is because larger operators are more likely to have the financial resources and managerial skills often necessary for adoption (Bultena and Hoiberg 1983). Standards for deciding what constitutes a large operation are not well defined, but Lacey et al. (1985) based their determination on animal units (AU) (One cow-calf pair and 5 sheep are equivalent to 1 AU). Three ranch sizes were described: small, 50-200; medium, 201-400; and large, 401 AU or more.

Respondents of this study reported herd size in either total number of head, mother cows, or ewes. These numbers were converted to AU, and the ranches were categorized in the size classes described above. The innovative ranchers operate on ranches of all sizes; the interviewees represented 4 small, 5 medium, and 6 large ranches. Apparently, innovative management may be more common on larger operations, but certainly exists among ranchers operating on small or mid-sized ranches as well. Likewise, Peterson and Coppock (2001) found that operation size was not an important indicator of innovativeness.
Past research has shown that high income levels are associated with adoption (Coppock and Birkenfeld 1999, Peterson and Coppock 2001). Due to the sensitivity of the subject, respondents of this study were not asked to reveal income levels in a face-to-face interview with a researcher. Instead, ranchers were asked if the ranch provided the primary income source for the family. While in some cases other family members work off-ranch jobs, each respondent said that the family was dependent primarily on ranching income. The fact that the ranch provides the primary income source, along with evidence that these ranchers are strongly committed to ranching, may explain why they choose to dedicate limited financial resources to improving the operation. These ideas are in accordance with results of a survey of Texas ranch operators, which revealed that investment in vegetation management practices was positively correlated with the degree to which the ranch family was reliant on ranch income (Rowan and White 1994). The idea that adoption may be associated with the degree of dependency on ranch income, rather than the size of that income, has rarely appeared in past adoption-diffusion literature.

In-depth interview results revealed that 7 respondents operated ranches completely independent of federal lands (6 respondents did not operate on any public land whatsoever; 1 had a state lease, but did not use federal land). Of respondents operating on public lands, some explained how they currently cope with the difficulties associated with implementing improvements on federal land (due to regulations and social pressures), or how they would adapt the operation and continue to ranch if they
experienced reduced access to public land. At the same time, these producers emphasized the importance of public land grazing to the operation.

[W]e're looking more at our private land and making it go further. That's kind of why we're looking at the management intensive grazing; to try to get more out of our private ground to make up for some of the loss of some of the public.

You know, [the extent to which I'm in control of the future of my operation] could change at any moment. An administration change and you're under a whole different set of rules. We, in our operation, I feel like we're in pretty good control in that we're not 100% reliant on the public lands. But, the public lands greatly enhance our operation. If we didn't have it, we could survive at a lower number of cows. If they kicked us off the summer range and the winter range, we would adapt with our private ground in different ways. So, I don't feel like I'm entirely at the mercy at whatever the whims of the BLM and Forest Service are. But having said that, I would work real hard to maintain our ability to graze public lands. It is vital to our operation, to make it go better and help us do the things we want to do. We need that.

From this information, it seems that a producer’s level of public land dependence may influence innovative management. The effect of public land dependence on a producer’s feelings about the future of the operation affects the decision to adopt innovations. Continued access to public land influences ability to stay in business and investments in improving public land (i.e., investment can be discouraged due to the potential to lose access to improved areas). Clearly, producers who are not dependent on public land, or who use public land but believe they would be able to continue ranching without access to it, can invest in improvements (especially on private land) with decreased risk associated with uncertainty about future public land access. These ideas are similar to those of Coppock and Birkenfeld (1999:15), who found that during a period of “Range Reform rhetoric,” the pro-active minority of Utah public land permittees planned to intensify use of private land in order to cope with the perceived threat of
losing public land access. The researchers suggested that intensification may provide these ranchers with continued ranching income and "reduced uncertainties associated with dependence on public lands."

One operator, who continues to invest in improvements on his private land and public allotment, was certain that he, along with all of his neighbors, would be forced out of the livestock business if public land grazing privileges were lost: "[If we lose our access to public lands], cattle in [this area's] a thing of the past. ... If we can't run on the government, then we're out of luck." Commitments to innovative management among producers who are uncertain about the future of the operation have not yet been explained. While dependence on public land certainly seems to play a role in innovation adoption, land stewardship and ranching lifestyle values influence some producers to innovate in the face of uncertainty. Several producers explained that making improvements on public land is often difficult due to regulations, but land stewardship values were well articulated when one respondent remarked, "If you love the land, you do all you can to protect it." He later explained devotion to improving private land as well: "When you own the land and love the land, it makes a lot of difference in how much work you put into it." These findings provide support for the idea that producers ranching on both public and private lands will innovate because they possess strong land stewardship values and are committed to their ranching livelihoods. This commitment to ranching was also illustrated by results of a Colorado survey, which revealed that ranchers dependent on ranching income and public lands were determined to stay on the ranch regardless of reductions in federal grazing privileges (Rowe et al. 2001).
Innovative management inspired by these values may allow ranchers who would be expected to be forced out of the business by such events to sustain their operations.

**Barriers to Innovation**

Several barriers to innovation were described during the in-depth interviews. Because even Utah’s most innovative ranchers perceive these factors to be barriers to adoption, they likely serve as obstacles for many other ranchers throughout the state. Again, much of the information was compatible with the existing innovation adoption framework. As suggested by Rogers (1995), characteristics of the individual, innovation, and social system were determined to be factors influencing adoption. Characteristics of the operation were also identified as barriers to innovation. This was expected due to information provided by previous research (Bultena and Hoiberg 1983, Lacey et al. 1985), although operation characteristics that had not been explored by other researchers surfaced as barriers to adoption among Utah ranchers. Finally, characteristics of the political-legal system in which ranchers operate, which had not been specifically addressed by other adoption researchers, were determined to negatively influence innovation adoption.

**Characteristics of the Individual**

Although respondents’ personal characteristics seem to positively influence innovation adoption for the most part, certain characteristics were identified as barriers to adoption. As explained above, these producers did not necessarily have high levels of income or risk tolerance (see previous section). Adoption of certain practices is slow at
times because ranchers wait for capital resources to become available for investment in improvements or until uncertainty associated with adoption is reduced. Even though the respondents were ranching full-time and most of them lived on or near the ranch, a lack of available time was cited as a barrier to further innovation. These time constraints were especially important when interviewees talked about diversifying their operations with recreation enterprises.

I don’t have the time, but I could probably make money at [running a fee hunting enterprise].

I think we could do more with recreation, running the dudes or camping or yurts or cabins or whatever. All you need is time and money, or people to do it. … it takes somebody full-time to tend to the public.

Commitments to the traditional ranching lifestyle reinforce reluctance to adopt certain innovations. This observation surfaced during the preliminary interviews as well. Some respondents of the in-depth interviews explained that while adding a recreation enterprise to the operation was an option they may consider in the future, they would rather not become involved in this type of business if they could maintain the ranch without it.

It’s mainly just we kind [that] of like being by ourselves out there, so just having people around is kind of a bother. We’re kind of used to having the place to ourselves. [Adding a recreation enterprise] is something we can do if we need to, I guess we just haven’t gotten to that point yet.

That’s hard on me to, watch people running around on my place. Especially if they’re not staying on the roads and they’re not where they’re supposed to be, then I’m just like a time bomb waiting to go off.
Meanwhile, one rancher who is currently running a recreation enterprise expressed that diversification was important to the economic sustainability of the ranch, but he would prefer to focus on more traditional ranching activities such as livestock production.

[Dealing with the public] hasn’t been a real big problem, but you know, you’re dealing with people and so, they may be happy with the way things are going and they may not be. …[the fee hunting business] has become a very valuable part of our business, as far as the bottom line…. If I had my real choice, I’d just as soon not have to guide hunters, you know. But it’s become so important, we’ll probably always do it. … Someday if we didn’t need it, I wouldn’t feel bad if we didn’t do it.

Interestingly, this rancher’s teen-aged son, who sat in on the interview, strongly disagreed with his father’s sentiments about the fee hunting operation. As his father mentioned the possibility of no longer being involved with fee hunting, the son shook his head in disagreement and remarked, “That’s the best time of the year!” The rancher noted that this was a result of the difference in age between father and son. It may be possible that as more ranchers diversify their operations, non-traditional activities such as catering to recreationists will become traditions among members of younger ranching generations, and adoption of such practices will not interfere with their ranching lifestyles. However, Jordan and Workman (1989b:252) define fee hunting as “an established tradition among native Utah landowners,” meaning that landowners in the state have been involved with fee hunting for many years. Despite this fact, this study reveals that some ranchers do not accept fee hunting as a traditional activity, and it is therefore reasonable to expect that certain producers will continue to perceive these kinds of activities as antithetical to the ranching way of life. These findings may provide insight as to why Coppock and Birkenfeld (1999), Peterson and Coppock (2001), and
Rowe et al. (2001) found that diversification of the enterprise was not a popular option among livestock producers.

While the ranchers interviewed were open to trying new things, this information provides further evidence that traditional ranching lifestyle values were strong within this group (see previous section), and that certain activities conflict with these values. The fact that some livestock producers choose not to diversify the operation with a non-traditional business illustrates Grigsby’s (1980) finding that ranchers will trade profit for lifestyle maintenance.

Characteristics of the Innovation

Rogers (1995) explains that 5 characteristics of innovations influence adoption: relative advantage, compatibility, complexity, trialability, and observability. Theoretically, ranchers will be more likely to adopt innovations that are perceived to (1) have clear relative advantage over old management practices, (2) are compatible with operational goals, (3) are less complex, (4) are able to be tested on a small-scale prior to adoption, and (5) quickly produce observable results. In discussing range management innovations with interviewees, it became clear that each characteristic was associated with the rancher’s decision to adopt. For instance, ranchers described how fee hunting was somewhat incompatible with livestock production, and that this impeded adoption.

[T]he big problem we have with [fee hunting] is hunting season is also cow-gathering season.

[A]bout the time [hunting season’s] going on, we’re still trying to finish up the rest of the fall work . . . . So, it kind of runs into conflict time-wise.
[Hunting season] comes at a real busy time of the year, too. We’re busy with everything else we’re doing.

Ranchers who are constrained by time resources may be unwilling to adopt practices that require a large time commitment during a particularly busy time of year. The perception that this innovation is incompatible with the ranching operation is reinforced by feelings that it is a non-traditional ranching activity, and adoption is discouraged even though some producers believe that diversification would be economically advantageous (i.e., the innovation has relative advantage) (see Characteristics of the Individual).

Information collected during the in-depth interviews revealed that new grazing systems (e.g., intensive rotational grazing) are difficult to adopt because ranchers feel that they cannot be tested on a small-scale prior to adoption (i.e., they do not possess a high degree of trialability) and do not have clear relative advantage.

We just didn’t know if [intensive rotational grazing] was going to work any better than what we’d been doing. …once you put up the fences, you’re kind of committed.

I don’t know if we could economically justify the fences and maintenance and everything to be able to get into a much more intensively grazed pasture system.

[I]f you do an intense grazing [on my rangeland], you’ll probably come back with a lighter calf. Because you’re forcing your animals to eat lower quality feed than they’re going to if they have a little more of a choice. …after thinking about it and thinking of the amount of work it would take, and up there it would take so much fence and water development [and] of course, the other alternative was to herd them. And that’s a lot of work you know, to sit there and herd them! And I decided no, I’m not going for that. I’ll do what we can live with and that’s it.

Interviewees had received information about intensive rotational grazing systems, but did not perceive this innovation to have clear relative advantage. They were not convinced
that the capital and time resource requirements necessary for adoption would be justified by a potential increase in profit. Additionally, one producer explained that even if he could increase the carrying capacity of his rangeland with such a grazing system, winter feed would still be a limiting factor, and having to purchase more hay to sustain the cattle through the winter was not an attractive option. Grigsby (1980) states that nonadoption of innovations among ranchers is not attributable to a lack of information, and Peterson and Coppock’s (2001) survey respondents never mentioned lack of information as a constraint to adoption. Likewise, results of this study indicate that adoption of intensive rotational grazing systems was not hindered by producers’ access to information. Rather, interviewees expressed that they had learned much about these grazing systems, but were uncertain that adoption would be more beneficial than the way they were currently grazing. As with fee hunting, some producers felt that an increase in profit was possible, but this would not be worth the required changes to their lifestyles (e.g., devoting more time to working on the ranch).

Relative advantage and complexity delayed adoption of vegetation and water management innovations. Due to the low productivity of arid rangelands and marginal returns from livestock production, some producers were uncertain of the advantages of investing in these types of improvements.

[You asked about cost, [with what we’d pay to treat an acre with Tordon] …, you’re buying the land over again on rangeland at that price.

[I]t’s a pretty big chunk of change to [create a water development]. So, you kind of have to scratch your head and think, ‘Am I ever going to get this much money back out of it?’
Obviously, improving forage and water resources is beneficial to ranching operations, and producers were interested in making such improvements. However, environmental constraints reduced the relative advantage and increased complexity associated with adoption. Ranchers are convinced of the advantages of improving forage, but because rangelands are often characterized by low productivity, ranchers are uncertain that vegetation treatments will produce advantageous results. Implementation of these kinds of innovations is further complicated by unexpected climatic events, such as drought.

"The reason we didn't [treat undesirable species] is because this year was so dry, and I didn't feel like the chemicals would work. If the plants are that stressed, you're just throwing [your money] away."

Two other respondents expressed concerns about the use of prescribed fire on their ranches. Again, the complexity associated with using this management practice heightened concerns about the fire getting out of control and made the ranchers reluctant to implement prescribed burns. The use of fire is perceived as risky, and implementation of prescribed fire is made more complex by unpredictable environmental conditions (e.g., drought or high winds). For producers who experience low returns from ranching and have scarce capital resources to invest in improvements, the risk of adoption is high. This risk is even more severe when the success of the innovation is dependent on climatic conditions in such harsh areas.

Adoption of range management innovations did not seem to be negatively affected by observability of results produced by innovations implemented by ranchers. Instead, respondents discussed being encouraged to innovate through observation of results experienced by others who had adopted innovations (see previous section). In this
way, observability positively influenced the ranchers’ risk perceptions associated with trying something new. Producers who had used innovations such as vegetation treatments also discussed the positive role of observability. For example, these producers were asked how long it took to see improvement after they implemented chemical and mechanical vegetation management techniques:

[T]he next spring you could see the dead brush and the green grass coming up behind it.

[A]s we started chaining, especially on that higher country up on the mountain, we saw results within a two-year period. Because as we took those trees out, ... we just got so much more growth on our native grasses. And also the water, we could see a tremendous increase in the amount of springs, and the amount of water in those springs... .

From this information, it seems that range management innovations produce satisfactory results for livestock producers, but potential adopters may need assistance in determining exactly how to implement specific improvements on their ranches or how to make certain range management practices more compatible with the existing operation.

Characteristics of the Social System

The traditional nature of the ranching social system serves as a barrier to innovation adoption. Information provided by this study as well as others (Smith and Martin 1972, Grigsby 1980, Bartlett et al. 1989, Rowe et al. 2001) confirms that ranchers place high value on the ranching lifestyle, and reject certain activities (e.g., diversification of the enterprise) in an effort to protect these values. As illustrated by the Sonoran Institute’s experience in southern Utah (Shepard et al. 2000), it is sometimes
difficult for individual ranchers to step forward and serve as the innovator within these traditional social systems.

During the in-depth interviews, ranchers described how other local ranchers react to innovation.

Most of the other producers don’t think too highly of [dude ranching]. …everybody just kind of looks down on [the ranchers involved] for doing it. I mean, they don’t blame them for doing it, they’re making money and doing well with it, but everybody just kind of says, ‘that’s not real ranching,’ you know. They just kind of frown on it, especially the older producers.

You know, when you get to doing some of these things, you get neighbors that are older and they don’t like to see people do things that they haven’t done. …some of these neighbors just don’t want to see us do something that they’ve never done before.

A lot of [the other producers in the area] are really skeptical about [the collaborative partnership to manage a sensitive species]. They don’t really like it. In fact, they’re scared of it. …some of the older guys are still kind of tough, you know, to convert!

Ranchers may be unlikely to innovate when they do not have the approval of their peers. Because ranchers are so dedicated to maintaining their ranching lifestyles, it is understandably difficult for them to cope with the possibility of their activities being labeled as “not real ranching” by other members of the ranching “subculture.” However, respondents indicated that these sentiments came primarily from older producers, and this might mean that certain ranching activities will be more accepted by members of this social system in the future. Furthermore, ranchers who are struggling to survive in the livestock industry may become more willing to cope with such reactions from peers in an effort to stay on the land.
Characteristics of the Operation

In the past when researchers have discussed characteristics of the operation as they relate to innovation adoption among agricultural producers, size of the operation and managerial aspects have been most commonly explored (Bultena and Hoiberg 1983, Lacey et al. 1985). Size of the ranches included in this study did not serve as a barrier to adoption (see previous section). Instead, results of this study demonstrate that spatial characteristics of Utah ranches negatively affect innovation adoption. This is an example of how a new element is added to an existing conceptual category within the theoretical framework (see Data Analysis for details).

Utah, like many other Western states, is characterized by a discontinuous pattern of land ownership. During the in-depth interviews, ranchers described problems with having their ranchland scattered out and trying to implement improvements on parcels of land not owned by one agency.

[W]e’re actually thinking about selling now so we can go to a place where we’re not 50 miles this way and 30 miles that way-so we can get it all together in one unit. ...the reason is to cut down on some of the work. We move our cattle about 5 or 6 times per cow onto a truck. I mean, every cow gets loaded onto a truck and moved here or there, and...compared to just opening a gate and working your cows...this is a lot of work. ... It’s hard to find enough ground all together here that’s not got somebody else right in the middle to make an economical unit. ... When you start running over 1,000 head in this area, you’ve got real problems, you’ve got to scatter out all over.

Due to these problems, this particular rancher has decided since the interview to sell his ranch in Utah and move to an area where he can purchase property large enough to run an operation that will support himself, his two sons who are coming into the business, and their families.
Results of the preliminary interviews revealed that location of the operation can limit diversification opportunities, and respondents of the in-depth interviews verified this finding. Certain producers feel that they cannot benefit from fee hunting because game animals are not present on their land during the hunting season, and other types of recreation would not be possible because the ranch is not located in an area that is appealing to recreationists.

[T]he winter's so cold here, the people that want a sleigh ride go to Jackson, [Wyoming] or somewhere there's a resort to do those things. ... And then the summer, there's so many horseflies and mosquitoes, it's hard to make a dude ranch, nobody wants to be around here in the summer.

[Our rangeland] just looks like a muddy tromped mess after [the elk have gone] through it. And so, they have done a lot of damage up there...[but when] it comes hunting season, you can't find them. They're gone.

Sometimes these problems are exacerbated by the land ownership pattern described above.

Our private ground on the mountain is also broken up into just a section here and a section there, and they're not contiguous, they're split up...kind of checkerboard with state land all around it. So, it doesn't really lend itself so you can control the access [for fee hunting].

Problems associated with partnering with adjacent landowners to establish a fee hunting business (also discussed in preliminary interviews) prevented some ranchers from finding a practical solution for overcoming difficulties of having their property spread out.

I don't know how well [fee hunting would work] because our ground is co-mingled with BLM and we haven't got a 10,000 acre block. And we've got some neighbors here that came here the same year we did, and when we say something's black, they say it's white. So, to try to get together...their ground is in worse shape than the BLM, so all you'd be getting is acres-not feed or anything that might help. ...I don't know how we can benefit from it. I think it would just be all minus and not much plus.
The problem created by the state’s land ownership pattern also made it difficult for producers to implement other range management innovations. One producer explained that he was interested in implementing vegetation improvements on public land, but because the state ground he grazes is in the middle of the Bureau of Land Management (BLM) property and is not fenced, he would not be able to use his entire allotment for a long period of time if he reseeded the ground.

To seed, you know, you’d have to fence and it’d be just like a burn, we’d have to keep the cows off it for a couple of years. So, we haven’t talked a lot about seeding. … If we could get a fence and keep cows off the BLM and just run them on the state for a while, then you could do something. But the way the whole allotment’s common, you really can’t do anything unless you take them off the whole allotment.

These kinds of problems are difficult for ranchers to overcome. Ranchers who are operating marginally in livestock production cannot be expected to bear the cost of resting an entire allotment when other forage resources are scarce or difficult to gain access to. The advantage of improving rangeland would be lost to the rancher if he suffers severe, negative economic effects from trying to implement improvements.

Because many of Utah’s ranchers do not live on the ranch, having their property scattered out can make implementing improvements especially difficult. Obviously, ranchers who are spending a lot of time each day traveling to and from the ranch or between the different parts of it are going to have less time to devote to making changes to the operation. For these ranchers, innovations that require a continued increase in management input, such as fee hunting or intensive rotational grazing, may not appear to be practical investments.
Characteristics of the Political-Legal System

Certain barriers to adoption discovered during the in-depth interviews had not been discussed by other researchers, and demonstrate that a new conceptual category can be added to the theoretical framework for investigating adoption among ranchers. These barriers were characteristics of the political-legal system in which ranchers operate. Although related to the social system in a broad sense, ranchers must cope with political-legal considerations in an entirely different way than they cope with interactions between themselves and other ranchers. Furthermore, Rogers (1995) notes that little research has focused on the social system's effects on adoption. For these reasons, the following barriers to adoption among ranchers deserve special attention so that ways for ranchers to cope with these barriers can begin to be explored.

Characteristics of government programs

Perceptions about the way government cost-share programs are administered can negatively influence innovation. An interviewee explained that while ranchers used to have access to a variety of cost-share programs, the NRCS Environmental Quality Incentives Program (EQIP) is now the primary source of cost-share funds. Several producers described the importance of these funds in making improvements to their rangeland. One respondent expressed that having access to cost-share funds greatly reduced the risk associated with vegetation management techniques, and without this kind of assistance, he could not have made the improvement.

Well, I didn’t feel too bad about it, because the Soil Conservation [Service] was helping. If it hadn’t have been for their help, I wouldn’t have done it. Because they paid, I think it was 70%, and there’s no way that I could have afforded to do
it. ...probably one of the big factors that I could see ... we border some state land on our private property and the Forest [Service] land quite a bit, and where we put [the chemical] out and they don’t do any projects like that, then we entice the wildlife onto our ground. Especially in the spring of the year, you can go and see the elk concentrated on that real heavy. So, the increased use by the wildlife on that, you know, makes a big difference. And without participation from an agency like that, you’re basically donating it to the public.

Another producer explained that he desired to implement vegetation improvements, but had not yet qualified for cost-share assistance and would have to try again.

I was going to selectively spray [sagebrush], but in order for me to get into that, I would have to have some help because it’s so expensive. And the program that was out there last year is the one with the money, but I missed that a couple times. But, I’ll put in again.

According to another respondent, the EQIP funds seem to be distributed to fewer producers working on large projects, and that when the money was distributed to more producers, more conservation projects were implemented.

We used to get a lot more conservation projects completed and more conservation done when we had the Ag. Conservation Program inside the USDA versus EQIP. They spend about the same money now as they did...but it seems to go to fewer and bigger projects. And I think when we had the cost-share program before, it offered the incentive to farmers and ranchers to do the project, to get them started. When we spread the money out thinner, to more producers, we got more conservation done than we do now. ... There’s less people getting a piece of the pie there. There’s less producers getting conservation money.

Of course, this producer’s perception about the way EQIP funds are distributed may or may not represent reality. The EQIP program started in 1997, and by 2000 NRCS had adjusted its formula for the program in order to make cost-share funds more widely available for rangeland projects (L. Ellicott, NRCS, pers. comm.). However, if producers believe that cost-share funds are disbursed to producers working on large projects, they may feel that the chances of receiving assistance are low and as a result, they may be
reluctant to try to innovate. This finding is particularly interesting in that it did not come out of interviews with range professionals. Range professionals may be unaware that producers’ perceptions about the way cost-share programs are administered can negatively affect adoption.

*Public land management and government agency regulations*

In-depth interviews revealed that producers making improvements to their rangelands are concerned about how adjacent public lands are managed. For instance, an interviewee discussed his anxiety about the possibility of elk moving into the area where his ranch is located because while he invests in improving his private land, government agencies that own surrounding properties have not implemented improvements. He therefore feels that if elk move into the area, his lands will receive heavy use because they are in such good condition when compared to adjacent areas.

[Elk] are knocking on our door and frankly, I’m scared to death of elk. I don’t know how to deal with them because of the fact that...our ground is so much more productive than the surrounding public land. ...if they find us, I’m afraid they’ll be devastating.

The producer quoted previously about the importance of cost-share funds expressed related concerns (see Characteristics of government programs). He emphasized that wildlife species are attracted to improved areas on his private land because surrounding properties owned by government agencies are not as productive, and he would therefore not have been able to justify investment in vegetation management without cost-share assistance. Another interviewee revealed that after he made improvements to public land, elk were attracted to that area, and the agency decided that the area was valuable elk
habitat and could no longer be used for domestic livestock grazing: "...[The vegetation treatment] worked pretty well, but they took that for elk! ... AFTER we spent all the money to improve it, they decided it was too good of elk habitat." These kinds of problems may discourage other producers from investing in innovation. Ranchers may feel that investments in improving rangelands are not beneficial if they will be encouraging heavy wildlife use in these areas while government properties in the area are in poor condition to support these animals.

Government regulations that ranchers must deal with in order to implement improvements also seem to deter innovation. Interviewees were discouraged by regulations that slowed the implementation of improvements, especially when they felt that the environmental benefits of the improvement were obvious.

[W]e‘ve put in a lot of gully plugs to stop erosion. And we had to wade through [US Army] Corp of Engineers red tape to do things that you know damn well need doing. You can see the erosion and yet they don‘t want you to touch that bank or do anything. And so, they‘ve cost us a lot of time. And there‘s still a lot of erosion things that need to be done up there, but I haven‘t had time to wade through the red tape. ...it gets discouraging when you‘re trying to make improvements, and even they know it‘s an improvement, and yet they want you to go through all this rigamarole. And so, I‘m sure that, well including myself, there‘s things you don‘t do because of that and you know they need to be done. And I‘m sure a lot of people that you‘ll find, they just say, ‘to heck with it!’

It may be difficult for ranchers who have limited time resources, such as those working part-time jobs in addition to ranching or those who spend much time implementing innovations, to devote time to these processes. In particular, this barrier could limit the implementation of conservation projects that are not expected to enhance profitability for the rancher. If producers become too frustrated with time-consuming regulations, they
may feel that the potential advantage of investing in conservation projects is not worth the trouble.

**Perceived liability associated with recreation enterprises**

Concerns about the liability associated with running a recreation enterprise emerged as a barrier to this kind of diversification in both the preliminary and in-depth interviews. While interviewees expressed that dealing with the public in a general sense was something they would rather not have to do (see Characteristics of the Individual), they felt that the liability associated with inviting people onto their ranch was something they were not able to cope with. For these producers, the potential to earn extra income was not worth the worry over this liability.

> [W]e’ve looked into [dude ranching]. … But whenever you’re dealing with the public, you’ve got a liability issue, and at this time, I’m not saying in the future, but at this time, the liability insurance would kill us. I don’t know how I’d handle the public. And that’s the reason I don’t want to get into [fee hunting], because it seems to be a sue-society.

Another respondent is involved in some recreation, but is reluctant to establish a full-scale recreation enterprise.

> [I]t’s mainly a worry about your liability and inviting somebody on your place. We did go and get more insurance a few years ago because we were uneasy about it. But you still worry about somebody getting hurt and suing you…. So, it’s a lot of worry about whether the money you get is worth the lawsuit you might end up in.

Perhaps if clear guidelines for protecting themselves from liability were made available to producers, some of the reluctance to diversify with recreation enterprises would be reduced. However, those who promote diversification as an option for enhancing the
economic sustainability of the ranch must also consider ranchers’ desires to maintain a traditional ranching lifestyle, influences of the ranching social system, and issues of how managing a recreation business is somewhat incompatible with livestock production (e.g., producers are faced with time constraints, especially during the hunting season).

**Competition Associated with Diversification**

In-depth interviews revealed that competition among fee hunting operations is a barrier to diversification, in addition to those discussed above. One rancher was interested in adding a hunting operation to his ranch, but was somewhat apprehensive about doing so because he has learned about problems of competition between existing operations.

I have a friend that has a hunting business... and it really took off and he was doing well, but now there’s one popped up right next to him... and they’re taking a lot of his business. And so, these people are creating competition.

The fee hunting program in Utah is popular, and interviewees who participate in it emphasized how valuable diversification has been to their ranching operations. Fee hunting is still being actively promoted in the state as a way for ranchers to enhance profitability of their operations. However, range professionals should be cautious about encouraging too many producers to diversify their operations in the same way. If the establishment of additional fee hunting operations creates serious problems of competition, producers who have already invested in this kind of diversification could be negatively impacted. As a result, efforts to encourage ranchers to stay on the land could be rendered ineffective. Further research is needed to quantify the level of competition among fee hunting businesses.
Preferred Information Sources

During the in-depth interviews, respondents were asked to identify their preferred information sources for learning about range management innovations. Due to the sampling process utilized for this study (see Respondent Selection), it was not surprising to learn that USU Extension was the most preferred information source, along with other ranchers who had been in the livestock business for a long time and had experience using new management practices. The National Cattlemen’s Association, Farm Bureau Federation, and NRCS were also popular among the interviewees. Additionally, use of the internet and trade magazines (e.g., Progressive Farmer) was described by a few respondents. Woolgrower’s Association, Society for Range Management, Soil Conservation Districts, and Farm Service Agency were also mentioned, although infrequently.

[The Farm Bureau Federation and National Cattlemen’s Association] give a lot of encouragement and help promote conservation.

[W]e’ve had lots of partners, NRCS and extension, and they’ve all been really good. … When we’ve had a question, they’ve been excellent to work with as far as finding the answers.

A respondent interested in establishing a fee hunting business described his use of the internet:

I use the internet quite a bit. That’s been pretty nice. In fact, yesterday I punched in pheasant hunting or duck hunting and pulled up tons of stuff.

When asked how easy or difficult it was to find information about range management practices, all respondents stated that it was fairly easy.

[I]n today’s age, you can find about anything really. You know, through the
internet or with these extension people. And if they don't know, they'll find out. I think it's pretty easy [to find information].

Nonetheless, interviewees related problems associated with learning about range management innovations. Time constraints were the primary barrier to finding information. For example, producers explained that availability of time resources sometimes limits involvement with ranching organizations.

Sometimes you get so scattered out trying to cover all your other stuff and trying to attend all those [meetings], too, and you get to spinning your wheels. Or me, I feel like I don't spend enough time with my family as it is. And if I'm gone lots of nights to that stuff, where do you draw the line?

One respondent was frustrated by not having access to concise information, and felt that he did not have time to devote to reading lengthy reports.

If you have the time, that's the thing that's difficult for me, because I want to find out something, but I don't want to spend the time wading through all the details. ...I want the conclusion, that’s all I want to see. I don’t want to know what they did or how they did it, I want the conclusion. I don’t have time for all that stuff. And so, if they would eliminate 99% of their report and give us a conclusion, then I'd be happy. Leave out the names and the dates and all they did, because about 90% of the article-I get so mad because I just want those last 2 or 3 sentences saying, ‘This is what we found out.’

This sentiment is not unreasonable when one considers that many livestock producers are faced with time constraints (see Characteristics of the Individual), and respondents of this study are known for devoting time to innovation in addition to everyday ranching and family duties.

While ranchers thought information about range management innovations was readily available, they were less certain about ways to apply the information to their situation. For instance, one respondent had learned about short duration grazing systems and had heard success stories of people who had adopted such systems, but said, “Tell me
how to make it applicable here.” This kind of problem may be difficult for range professionals to address without a better understanding of the process by which producers go about fitting an innovation to their particular situation. Especially in reference to making changes to grazing systems, respondents often explained that experience on the ground and trial-and-error experiments led to the development of a system suited for their ranches. Range professionals were certainly credited for their assistance, but the individual rancher’s adaptation strategy seemed to be an extremely important factor in determining the success of a management change.

I know I’ve talked to a lot of different people about things that we’ve done, but I’ve found that if I can draw on their expertise and put what I know about being on the ground together, things usually work out real well. But you know, just to have someone come in and tell you how to do everything, I have never done that because I’ve always felt that the person that knows the ground best is they guy that’s there. …and you go around and look at different things that people have done, and some of them will work on your ground and some won’t. But the guy that’s on the ground knows more about what will work and what won’t. But there again, you need to go to the experts to find out what’s out there.

With a better understanding of the adaptation process, range professionals may be able to more effectively facilitate this process. There seems to be a need for “mentoring” (i.e., working directly with ranchers to find ways to adapt and implement innovations on their ranches) as well as “extending” information about the innovation. Ranchers are not having trouble finding information related to range management, but may need assistance in exploring ways to apply the information on their ranches (see Barriers to Innovation). Perhaps these kinds of problems will also be alleviated as innovators/early adopters introduce range management innovations into the local social system. As producers are able to observe results of innovative management in familiar areas, ideas may be
generated about how to adapt innovations and make them compatible with their own ranches.
CHAPTER V

CONCLUSION AND IMPLICATIONS

This study not only demonstrates the usefulness of applying past adoption research to exploration of innovation adoption among Utah ranchers, but enhances the overall theoretical framework by defining new conceptual components. Exploration of these components may help future researchers further the understanding of adoption among livestock producers.

Rogers (1995) and others who have studied innovation adoption in agriculture (Pampel and van Es 1977, Bultena and Hoiberg 1983, Nowak and Korschling 1983, Buttel and Swanson 1986, Swanson et al. 1986, Saltiel et al. 1994) and among ranchers (Lacey et al. 1985, Rowan and White 1994, Coppock and Birkenfeld 1999, Kreuter et al. 2001, Peterson and Coppock 2001) have contributed to the development of the theoretical framework that guided this research. Based on this prior work, it was expected that innovators/early adopters in Utah would have large operations, frequent contact with extension agents and ranching organizations, and prominent land stewardship values. Results of the in-depth interviews verify that personal characteristics of the rancher, attributes of innovations, and characteristics of the operation and social system influence the adoption decision.

Values held by the individual rancher can simultaneously inspire innovation and reinforce a reluctance to adopt certain practices. Ranchers who are characterized by strong ranching lifestyle values are motivated to innovate as a lifestyle maintenance strategy, but may reject practices such as diversification if they perceive that...
nontraditional activities threaten the ranching way of life described by Grigsby (1980). These values are also manifested in the ranching social system’s reaction to innovation. For example, members of the local ranching community sometimes discourage adoption by expressing the opinion that involvement in certain activities is “not real ranching.”

Characteristics of innovations negatively influenced adoption, especially in regard to innovations relevant to the Cedar Mountain Initiative. For diversification, incompatibility with the operation and operator’s values seems to create an obstacle to adoption despite perceived relative advantage. New grazing systems, in contrast, were not implemented because ranchers were uncertain of their relative advantage and feel that these kinds of innovations have low trialability. Producers also feel that adoption of vegetation management practices was complicated by the low productivity and unpredictability associated with rangeland environments. While these barriers are sometimes exacerbated by characteristics of the operation (e.g., ranchers are faced with trying to implement improvements on properties that are not contiguous) and characteristics of the individual (e.g., many ranchers in Utah have off-ranch residences, which complicates the adoption of management-intensive practices), observability of range management innovations seems to positively influence adoption. Ranchers reported being able to observe immediate results of vegetation treatments on their ranches and being encouraged to innovate by observing innovative management of other producers. This phenomenon illustrates the importance of opinion leaders within the ranching community.
The fact that several ranchers altered innovations to make them work on their ranches and reported problems making certain innovations compatible with the existing operation illustrates a sixth characteristic of innovations. This characteristic could be called malleability, and it is the degree to which an innovation can be manipulated or changed to fit an individual adopter’s situation (Sharp 2001). Even though Rogers (1995) suggests that individuals often adapt innovations so that they are more appropriate to their particular situations, this idea has not been widely incorporated in adoption-diffusion research. Instead, researchers commonly assume that innovations are rigid (i.e., they have fixed characteristics) (Sharp 2001). An example of the usefulness of considering malleability relates to the adoption of new grazing systems. For instance, producers who are interested in changing their grazing systems have to find ways to make the system work on the unique physical landscapes that are available to them for grazing.

Results of this research confirm that ranchers value the traditional ranching lifestyle, and that innovation adoption exists only among the minority of ranchers in Utah. However, with consideration of certain obstacles to adoption, range professionals may be able to facilitate innovative management, which can improve both the economic and environmental sustainability of ranch operations.

First, physical characteristics of the operation emerged as factors influencing adoption that have not been explored by past researchers. Utah ranches are characterized by unique spatial characteristics that make certain range management innovations difficult to adopt. Professionals should note that what works well in other western states may not work as well in Utah due to these factors.
Respondents also provided information about the way ranchers are affected by the political-legal system in which they operate. Innovation adoption appears to be negatively influenced by (1) perceptions about the way government cost-share programs are administered, (2) government agency regulations and the management of public lands adjacent to private properties, and (3) the perceived liability associated with diversifying ranches with recreation enterprises. An effort should be made to learn more about rancher perceptions of how these factors influence their abilities to implement innovative management. If misperceptions about the political-legal system are common among livestock producers, perhaps steps can be taken to alleviate unnecessary concerns. Government programs, for example, can be monitored so that the way they influence adoption is better understood. At the same time, ways for producers to cope with difficulties imposed by the political-legal system can be investigated. In today’s changing social-political environment, ranchers are being faced with problematic issues that they may not have encountered before, and options for coping are likely unclear.

The problem of competition among ranchers involved with fee hunting operations deserves special attention. Ranchers struggling to stay on their land should not be encouraged to make an investment in this kind of diversification if it will not help them and will cause negative effects for others participating in fee hunting. The unintentional creation of serious competition could limit success among participants and discourage innovative management of wildlife species and habitat.

Finally, this research provides insight to what kinds of ranchers in Utah are adopting innovations. Extension agents or others who serve as change agents among
ranchers can use this information to target innovators/early adopters with programs designed to promote new range management innovations, however, results indicate that a lack of information about existing innovations is not a barrier to adoption. Instead, there is a need for mentoring within the ranching community. While ranchers feel that information about range management is widely available, some individuals do not understand how to apply the information on their ranches. If range professionals can serve as mentors for innovators/early adopters, innovation adoption among opinion leaders may increase, which would facilitate the diffusion process (i.e., the process by which innovations are spread to members of the social system). Rogers (1995) explains that innovators and early adopters play an important role in the social system because they often serve as opinion leaders. By introducing an unfamiliar management technique to the social system, innovative ranchers allow the outcomes to be observed by other local ranchers. As a result, uncertainty associated with adoption is reduced, and producers may feel more comfortable investing in similar innovations. Because a professional mentoring program would provide a way for opinion leaders to become more familiar with implementing range management innovations and to share these experiences with other ranchers in the social system, this kind of approach would likely be more effective than increasing the amount of general information disseminated by professional or media sources.

The findings produced by this research provide several ideas for future research. First of all, the validity of this study should be tested by using a quantitative approach, or by repeating the research in another state or with a different class of innovations. Also
useful would be studies of the processes ranchers go through to make a new management practice work on their ranches, because such an understanding could help professionals facilitate this process among other ranchers. It is noteworthy that while university range scientists often focus on ecological questions related to range management, this study did not find that lack of ecological knowledge is a barrier to innovation. Instead, overcoming obstacles to making management changes seems to require ideas about how to cope with social and political issues. Many of these issues are new to ranchers, and research investigating ways to cope with these challenges has the potential to positively influence innovation adoption. Possibilities include exploring ways that government agency regulations and management of adjacent public lands affect ranchers’ abilities to innovate.

Perhaps learning more about why specific range management innovations are not adopted would be more useful than continuing to study certain biological aspects of innovations without consideration of why they are not being used. For example, if many livestock producers in Utah feel that they are not able to implement management intensive grazing systems because they do not live on the ranch, work off-ranch jobs in town, and would not have the additional winter feed it would take to support an increased herd, further research about whether or not these systems lead to a production increase may not improve adoptability. As Bransby (1989) suggests, it is important for researchers whose results are ultimately intended to benefit the livestock producer to not become focused on biological considerations to the exclusion of producer needs.
As ranchers experience threats to their livelihoods due to social pressures, harsh climatic conditions, and marginal profitability, adoption of new management practices could provide a way for them to stay in ranching. Because respondents of this study indicated that they are motivated to innovate in order to protect or improve natural resources, people outside of the ranching community stand to gain from ranchers’ innovative behavior as well, and therefore the public should be interested in ways to encourage adoption among livestock producers.
LITERATURE CITED


APPENDICES
Appendix A. Preliminary Interview Guide
Interview for extension agents/NRCS employees

Would you share your ideas about the kinds of innovations ranchers in this area are currently trying or expressing interest in?

We have found from literature review that personal characteristics of the operator and the social environment can influence adoption.

- Which ranchers seem to be innovating? (names of operators and personal characteristics)
- Do they operate on larger ranchers?
- Do they depend mainly on ranch income or other sources?
- What is their age group?
- Do they work closely with extension/NRCS? Do they actively seek information about innovations?
- Do they seem to exhibit strong traditional ranching values?
- What is their risk orientation (do they accept much risk associated with making a change in management)?
- Do these operators have large interpersonal networks?
- Are these operators considered to be information sources for other local ranchers?
- How are the new things they are trying on their ranches perceived by other local ranchers?

It is also generally accepted that attributes of innovations influence the adoption process. Why are ranchers in this area implementing these particular innovations?

Do ranchers perceive the innovations to be:
  - Economically beneficial?
  - Convenient?
  - Environmentally beneficial?
  - Simple to use and understand?
  - Compatible with the operators’ needs, values, and goals?
  - Easy to test on a trial basis?

Are there certain innovations about which ranchers in the area express interest but then do not implement?

Why?
  - Economic constraints?
  - Time constraints?
  - Social pressures?
Interview for ranchers

What kinds of changes are you currently making or are interested in making on your ranch?

What kinds of changes do you know of that other ranchers are making or interested in?

Why are you/other ranchers making these particular changes?

Are there particular innovations that you have learned about, but then find that you cannot/don’t want to use them on your land? Why?

What information sources do you prefer to use to learn about innovations? Why?
Appendix B. Letter Used to Collect Names of Potential Interviewees
August 7, 2001

Dear Utah Range Professional,

As part of a research effort at Utah State University (USU), we are exploring changes that Utah’s livestock producers are making to improve the land. We hope to conduct in-depth case studies with some of Utah’s most innovative producers so that we can learn what motivates or prevents ranchers from implementing rangeland improvements.

We are specifically interested in land-based innovations that enhance both the environmental and economic sustainability of the ranch. For example, a rancher that works to improve wildlife habitat on the land to improve a fee-hunting operation would fit well with this study. In contrast, animal-based innovations, such as crossbreeding, are not the focus of the current project.

Because you are professionals who work with the state’s producers on a regular basis, we would deeply appreciate your help identifying innovative producers. We are trying to build a list of progressive ranchers by working with the Natural Resources Conservation Service, USU Extension, and the Utah chapters of the Farm Bureau Federation and National Cattlemen’s Beef Association. If you can provide names of ranchers from your area that fit our description, please reply by e-mail or feel free to contact us by phone to discuss the project in greater detail.

Thank you in advance for your cooperation.

Sincerely,

Liz Didier
Graduate Research Assistant

Mark Brunson
Associate Professor
Appendix C. Letter Sent to Potential Interviewees
October 10, 2001

Dear Utah Livestock Producer,

We are researchers at Utah State University (USU) who are part of a team studying ways to improve Utah’s livestock operations both economically and environmentally. We especially want to understand how producers make changes to their operations to improve the range.

Members of the range and livestock management community in Utah have identified you as a producer who has successfully made range improvements. We hope to conduct in-depth interviews (about one hour in length) with ranchers like you. If you are willing to participate, the interview will be set up at a time and location that is convenient for you.

We believe that USU Extension and other natural resource professionals can serve Utah’s livestock producers more effectively if we know more about the factors that influence the use of range improvements. Most importantly, by sharing your experience, you will be helping other producers who desire to improve their rangelands.

We don’t believe that taking part in our study will pose any risks for you, but we do feel it’s important to protect your privacy. Therefore any information that you share with us will be kept confidential. We will be taking detailed notes of the interview, and audio taping it if you don't object. All notes and tapes will be kept in a locked filing cabinet that only the two researchers can open, and we'll destroy those materials as soon as the project is finished. Your name, the name and location of your ranch, and any details that could be directly connected to you will not be released without your permission. Your ideas and experiences can greatly enhance the quality of this project.

In a few days, we will be contacting you by phone to set up an interview appointment. If you have any questions about the study, please contact Liz Didier at (435) xxx-xxxx or you may reach her in the evening at (435) xxx-xxxx. She will be the researcher conducting the interviews. Thank you in advance for your time and cooperation.

Sincerely,

Liz Didier
Graduate Research Assistant

Mark Brunson
Associate Professor
Appendix D. In-depth Interview Protocol
Background:
To get started, I’d like to ask you a few questions about your operation.

First, would you tell me a little about the history of the operation, for example, has it been in the family for several generations?
What amount of private land is used for the operation?
What is the approximate herd size?
Do you use any public land for livestock production?
Do you live on the ranchland? If not, how far do you live from it and how long does it take to travel to it?
Do you ranch full-time?
Would you say that the ranch is the primary income source for the family?

Range Improvements:
The focus of this particular study is the use of range improvements on Utah’s rangelands.

Would you describe some of the range improvements you have used in the past? Have you diversified the operation (included other ways to earn income from the land)?
What were your primary reasons for making these changes?
When you were making the decision to use this particular improvement, did it seem like there was a high level of risk associated with it?
How certain were you that the improvement would result in the intended outcome?
Had other producers in the area used this improvement before?
Did you learn of other producers outside the local area that had made this change? If so, was the improvement successful?
Were you able to test this improvement on a small scale before you used it on a large part of the ranch?
How much time passed from the time that you made the change until you could observe the outcome (negative and desired results)?
How difficult was it to use this particular range improvement (expense, time, skill required, maintenance)?
How satisfied have you been with the improvements/changes you have made?

Barriers to innovation:
Have there been other improvements that you were interested in using, but did not?
What were they?
What prevented you from using them?
Are there any specific improvements that you are interested in using in the future?

Social network:
How did other producers in the area react to the changes you made?
Have any of them made similar changes since you first used these improvements?
How much contact do you have with other area producers? What about producers that live out of the local area?
Have these other producers made many changes to their operations? To what extent do you think they are open to new management ideas?
Do you belong to any ranching organizations? What about other organizations?

**Information sources:**
What sources do you use to learn about range improvements?
Which sources do you most like to use to learn about improvements?
How easy or difficult has it been for you to find information that is useful to you?

**Future of the operation:**
In spite of the pressures and changes facing the livestock industry today, to what extent do you feel that you are in control of what happens with your operation?
What do you expect will happen to your operation after you retire?