

Coordinating fence law with range management strategies in the USA

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Summary

In areas where livestock production predominates, a 'fence-out rule' as opposed to a 'fence-in rule' has been advocated due to perceived economic advantages associated with open-range livestock production; people desiring to have no livestock on their properties need to construct fences. Yet a region's total economy may be enhanced by moving away from established fence-out and cost-sharing rules. With changes in public perceptions of property rights, advances in technology, and the acquisition of new scientific information, fence rules should be expected to evolve. This paper articulates political, economic and scientific considerations in the USA that may be contemplated by citizens and elected officials for altering directives controlling livestock. To promote economic efficiency and social well-being, the paper advocates the scrutiny of existing fence-out and cost-sharing rules in a region to determine whether alternative rules should be preferred. The demise of fence-out rules in some areas in the USA and other countries could help achieve a more sustainable use of range resources.

Keywords: fence costs, fence law, livestock trespass, property rights, range management

Introduction

Legislative bodies in the USA have adopted assorted fence laws regarding the enclosure of livestock to address conflicts arising from the activities of domestic animals (*Colonial Laws of Massachusetts* 1672; Hart 1996). Changes in population, technology, and environmental objectives alter the consequences of fence laws so that the amendment of existing legislation may be advisable (Centner 1997). Distinct from fence laws but related to livestock management are grazing strategies to enhance economic returns (Walker 1995; Holechek *et al.* 1998), preserve ecological resources (Vallentine 1989; Dosskey 1998), and provide for sustainable production (Wang & Hacker 1997). Emerging land-use demands, including recreational activities and environmental concerns, often favour the use of fences (Loomis *et al.* 1989).

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The aim of this paper is to present contemporary scientific, economic and social components for use in revising fence rules. While the economic consequences of fencing in the USA have received attention (Ellickson 1991; Taylor & Geyer 1993), they have not been sufficiently related to other issues. Distributional changes in land-use and a region's land needs may favour the reallocation of historic fence entitlements away from ranchers. Undercompensation for livestock trespasses may support abrogating a fence-out rule. Cost-sharing directives in the USA sometimes oblige people to contribute to fencing expenses regardless of need. Given the current interest in the USA in private property rights and environmental protection, the evaluation of these issues leads to a conclusion that existing fence rules in the USA will be refined over the coming years. Research on American fence rules suggests opportunities for regions in other countries to re-examine their fence rules to provide additional safeguards for recreational activities, natural resources and the environment.

Fence rules

With respect to responsibilities for controlling livestock, two major antithetical options have evolved over time. For areas of open range, livestock owners may let their livestock roam under a 'fence-out rule' (Mockler 1959; King 1982). People who desire to exclude livestock need to build fences to keep them out, and livestock owners generally are not responsible for damages caused by meandering livestock. Alternatively, a 'fence-in rule' (King 1982; Steward 1995) based on English common law principles (Dyer 1592; Blackstone 1768) requires livestock owners to enclose their animals. Under a fence-in rule, neighbours are free to pursue various land-uses without the disturbance of unwanted livestock. In the USA, individual state fence-in and fence-out laws establish rules that assign rights in competing interests between ranchers and neighbouring property owners.

Political and economic justifications have long influenced the selection of fence laws for a state or a region. Due to the vast areas available for open grazing in the USA during the seventeenth and eighteenth centuries, the fence-in rule was not suitable. Rather, given the political power of ranchers, most areas of the USA adopted a fence-out rule (Hart 1996). Although fence-out was the fencing rule in most areas of the USA at one time or another, as crop production and other land-uses replaced livestock production, state legislatures re-established fence-in rules in the USA. Today, an overwhelming majority of states and counties in the USA

grant property owners the right to be free of the livestock of others, and ranchers are liable for damages which their animals cause to neighbouring property.

For some rangeland areas in the western USA, political power of livestock producers, the predominance of livestock production, and the cost of fencing mean that fence-out rules have been retained (Ellickson 1986). Fence-out rules generally include provisions concerning the construction of fences and describe what is meant by a 'lawful' fence (Vogel 1987). People with lawful fences have a right to be free of livestock, and if livestock break through a lawful fence, the owner of the invaded property may collect monetary compensation for the livestock trespass. For example, Nevada law precludes collection of damages for trespassing livestock unless the livestock breaks through a lawful fence (*Nevada Revised Statutes Annotated* 1997). Under this law, Nevada maintains a fence-out regime for animals, but property owners who do not want livestock on their property have rights once they construct a fence.

A few states in the USA with fence-out rules may allow municipalities and other locales to adopt a fence-in rule. Utah law provides for a county legislative body to adopt an ordinance for the fencing of farms and other private property (*Utah Code Annotated* 1997). In Idaho, owners of taxable real property may establish a herd district whereby it would be prohibited to allow enumerated animals from running at large (*Idaho Code* 1997). In the alternative, a state with a fence-in rule may allow for no-fence districts where property owners do not want fences to control livestock (*Arizona Revised Statutes Annotated* 1995).

As non-grazing demands for rangelands increase, the historic political directives embodied in fence laws may not delineate an optimal solution (Vogel 1987). Problems with underlying assumptions and uncertainty may limit the preference for an existing rule. Recent findings concerning the use of public rangelands show diminished value of these rangelands as uncertainty increases (Egan & Watts 1998). In other cases, fencing decisions may omit full consideration of contemporary agronomic research concerning grazing practices (Holechek *et al.* 1998), ecological concerns (Vallentine 1989), and long term sustainability (Wang & Hacker 1997). Changes in land-use suggest that conventional reasons for fence-out laws cannot be justified in some areas (Centner & Griffin 1998). By changing the rules governing the enclosure of livestock, a region may achieve greater economic efficiency with accompanying social and ecological benefits.

Distributional changes impacting the choice of fence rule

Due to contemporary knowledge of the use of common property, rangeland research and localized changes in land-use, the validity of a fence-out rule may be further challenged. Considerations supportive of fence-out rules may no longer apply in some areas, including areas where livestock production is the dominant activity. Possible economic limitations of

resources held in common and accompanying uncertainty may support a move to a greater delineation of management responsibilities or property rights. Scientific discoveries on rangeland management and livestock production may mean that the existence of fences to control livestock could improve productivity. Changes in the land-uses and needs of a region may also mean that a fence-out rule should no longer be preferred.

Common property and uncertainty

In a classic paper, Hardin (1968) showed how the public use of a resource could result in its demise. While close-knit communities may be able to manage common properties (Ellickson 1993), population growth and other changes may destabilize customary institutions (Runge 1981). For given commons problems, privatization of the property rights may be recommended. However, when the administrative costs of an individual property system are high, or the privatization of common property simply shifts the commons problem to another forum, governmental ownership may be recommended (Rose 1986). Along a similar line, economic optimization of a grazing regime may not be a preferred solution due to its failure to account for ecological sustainability (Hu *et al.* 1997).

Fence rules or practices that permit overgrazing create a potential for decreased sustainability of the resource and lower overall productivity. Fence rules that encourage short-term gains over long-term productivity, such as grazing leases, can also lead to the non-optimal use of a resource. For example, the uncertainty accompanying governmental leases has been found to raise the potential for overgrazing (Johnson & Watts 1987). Common resources might benefit from the employment of appropriate institutions and management techniques that nurture the resource (Feeny *et al.* 1996; Ostrom *et al.* 1999). Alternatively, it may be possible to adjust fence rules to respond to the problem of the 'tragedy of the commons' (Hardin 1968) by incorporating regulatory limits or management responses in order to curtail damages.

Specific research on ranch values and public grazing permits has suggested that the non-definition of property rights can lead to uncertainty detracting from economic performance (Egan & Watts 1998). Based on an analysis of the values of ranches with federal grazing permits, Egan and Watts (1998) inferred that pressures by environmental groups for alternative land-uses on federal grazing lands had created greater uncertainty in the security of federal grazing permits. Four reasons for the uncertainty were advanced: (1) uncertainty of having desirable permits in the future, (2) a land management emphasis accompanied by decreased cash flows, (3) changes regarding stocking and forage, and (4) declining land values for livestock production (Egan & Watts 1998). Given the uncertainty, the value of federal grazing permits declined. If a rancher's investment is not secure due to the lack of a succinct delineation of property rights, transaction costs will be high and the value of nearby public rangelands will be diminished.

Lambert (1995) looked at public rangelands and surmised that the failure to clearly delimit users' rights to consume, derive income from, and alienate various attributes of the public land resource might be expected to decrease the efficiency of the resource use. Transaction costs are high due to the poorly-defined rules governing grazing permits. These findings raise an issue of whether a similar problem may exist with respect to a fencing regime. In areas where a fence-out rule prevails, uncertainties may denigrate the value of the land to potential users. Or, a 'common's problem' might exist to preclude the best long-term use of the resource. While the lack of empirical evidence makes this hypothesis difficult to test, extrapolations of the conclusions of other research suggest that fence-out rules should be scrutinized carefully to determine whether they can be justified for a particular regime.

Management strategies

New research on range management and management techniques shows that fencing may be advantageous to achieve desired results. Wildlife, livestock, and plant populations may need to be managed to maximize animal production, and such management may be dependent on the use of fencing. Rangelands need to be examined to determine whether a fence-out rule is precluding an appropriate stocking rate or other practices to thereby detract from overall long-term productivity. Fencing may enable ranchers to adopt grazing rotations and stocking rates that increase overall productivity (Walker 1995; Holechek *et al.* 1998) or improve livestock distribution (Hart *et al.* 1993; Heady & Child 1994). Precluding livestock from defoliating a species may enhance a particular rangeland (Zhang & Romo 1995).

Alternatively, for some areas, the free migration of livestock may be beneficial (Tainton *et al.* 1996). Complexities of ecosystems call for different grazing management systems. Enclosing some areas that experience seasonal and spatial forage resources and allowing continuous grazing may lead to the reduction of some grassland species in favour of bushes (Hoffman & Cowling 1990). Tracking pulses of forage production may be an optimal grazing strategy (Tainton *et al.* 1996). Thus, alternatives to fencing might be espoused to respond to these conditions.

Another management tool may be to preclude overgrazing that depletes or harms the grazing resource (Hans 1994; Ricklefs 1997). Although occasional heavy grazing may be economical, care must be taken to avoid possible permanent damage to rangeland plant communities by heavy grazing over a number of years (Manley *et al.* 1997). Wang and Hacker (1997) suggest that economically optimal grazing management may not be compatible with the regeneration of degraded rangeland. Rather, some period of non-optimal management is needed for the regeneration of degraded rangelands. Rangelands which have lost native perennial grasses over time may need to be 'pushed across "thresholds" of environmental change to more socially-desirable stable plant states ...' (Cooper & Huffaker 1997). Alternatively,

management techniques may be available to increase the quantity and quality of herbage for livestock resulting in more efficient conversion of feed into an animal product (Pearson & Ison 1987; Huston & Pinchak 1991).

Fences may be beneficial in helping preserve native vegetation and habitats. Fences can prevent the destruction of vegetation by meandering livestock near water sources and reduce the adverse effects of livestock on water quality and sport activities (Valentine 1989). For example, fences may be used to maintain riparian buffers to assist in the management of riparian areas (Dosskey 1998). While fences may be used under fence-in and fence-out rules, the appropriation by others of benefits of range management practices under a fence-out rule suggests that such a rule is not conducive to the adoption of advantageous techniques. Rather, a fence-in rule might be the preferred strategy to encourage the adoption of management strategies where livestock need to be excluded from an area.

Changes in land-use

Changes in population and non-ranching activities may alter the advantages of an existing fence rule. The most obvious change may be an increase in the value or the intensity of agricultural cultivation. If crop production moves into an area formerly used for grazing, the new land-use diminishes the efficiency reasons for selecting a fence-out rule (Vogel 1987). Whenever the value of open grazing under a fence-out regime has declined relative to other land-dependent activities, there may no longer exist an economic preference for fence-out in terms of total welfare (Centner & Griffin 1998).

A second major change may be an increase in non-agricultural land-uses (Ellickson 1986). Emerging land-use demands, including recreational endeavours and environmental concerns, may favour the curtailment of roaming livestock (Loomis *et al.* 1989). Recreational activities by neighbours may be dependent on the control and exclusion of livestock. For example, adverse effects on fish habitats through the destruction of vegetation by meandering livestock may occur in the absence of fences along streams (*Oregon Natural Desert Association v. Bureau of Land Management* 1997). As recreational activities and ecological concerns become more prevalent and provide new income opportunities for property owners, the new interdependencies can support a change in fence rules (Centner & Griffin 1998).

Undercompensation for trespass

A fence-in rule might be preferred over a fence-out rule due to the potential for inadequate compensation to neighbours for livestock trespasses, assuming society feels that compensation is due. Entitlements created by fence legislation are infringed by ranchers whenever cattle unlawfully break through a fence. While this infringement qualifies the entitlement holder to *ex post* relief based on causes of action in trespass, nuisance or conversion, it may be difficult to extract

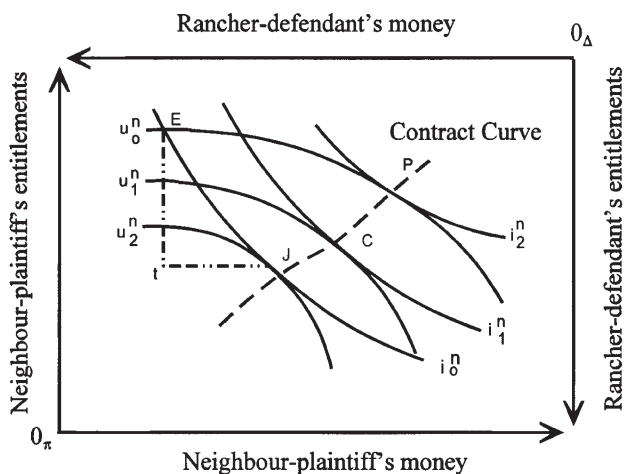


Figure 1 *Ex-ante* bargaining versus *ex-post* liability by plotting the theoretical relationships between neighbours and ranchers. Let E = initial entitlement; u_0^n = neighbour's initial utility function; i_0^n = neighbour's initial indifference curve; J to P = contract curve; C = point after *ex ante* bargaining; and J = point after *ex post* lawsuit.

appropriate compensation. Because a neighbour's property right is worth more via *ex ante* compensation pursuant to a voluntary contract than would be recovered as ordinary damages under litigation, recovery for trespassing livestock through a lawsuit may undercompensate the landowner.

Haddock and McChesney (1991) disclose that appropriations of property rights generally result in defendants paying plaintiffs ordinary damages. Ordinary damages leave a plaintiff undercompensated and a defendant with a windfall whenever the plaintiff's property right is worth more via an *ex ante* transfer than the amount recovered in *ex post* litigation. Livestock that trespass on a neighbour's property constitute an appropriation of property rights. Ellickson's (1991) research in the USA suggests that a windfall to ranchers is occurring. Neighbours rarely collect adequate damages in livestock disputes due to social reasons and the inconvenience of attempting to collect damages.

Drawing from Haddock and McChesney (1991), an Edgeworth box may be employed to show this dichotomy for neighbours' entitlements (Fig. 1). A neighbour's utility may be mapped over the neighbour's alienable entitlements. Let the lower horizontal axis denote the neighbour-plaintiff's money and the left vertical axis denote a neighbour-plaintiff's entitlements. The initial utility function for the neighbour is u_0^n . A corresponding map for a rancher-defendant may be imposed on the upper horizontal axis and the right vertical axis. Indifference curves and a contract curve may be added with initial entitlement E . Assuming that there are no transaction costs and no legal process costs, a court will correctly impose liability for every right violated, and no liability will occur if no right has been violated.

A reflection on the property rights of ranchers and neighbours acknowledges that they may vary considerably

depending on the use of the property and the subjective expectation of a particular neighbour. This suggests that a neighbour's property protection is an illiquid market with no standard price quotation. Given initial entitlement E , protection of property rights involving *ex ante* bargaining and an exchange pursuant to a contract curve between points P and J , say point C , results with both the plaintiff and defendant sharing the gains of the exchange. If the neighbour-plaintiff's entitlement is taken and the remedy is an *ex post* lawsuit, the plaintiff would be compensated with ordinary damages. Such an award would make the plaintiff whole, which would return the neighbour-plaintiff to the indifference curve passing through the original entitlement, i_0^n , which is point J . The neighbour-plaintiff would lose tE and receive compensation tJ ; however, point J leaves the neighbour-plaintiff in an inferior position vis-a-vis an *ex ante* contract, point C . Thus, tort damages for livestock trespasses may leave neighbours undercompensated.

Undercompensation of neighbours also may occur whenever a person's property has an idiosyncratic or situational value in excess of the property's ordinary value (Kaplow & Shavell 1996). Residential property owners tend to place a higher value on their specific property than others so that the property's idiosyncratic value is underestimated (Kaplow & Shavell 1996). Homeowners may expend funds on properties for particular personal enjoyment that do not increase the value of the property. Due to the existence of idiosyncratic values and situational values, there exists imperfect information about the harm caused by trespassing animals. Suits for trespass damages would not reflect all of a homeowner's true damages.

Fence costs

Various state fence laws in the USA do not always require the person desiring a fence to bear all of the associated costs. Four major cost options were incorporated into various state laws in an attempt to provide a manageable and equitable policy for an area. The general directive under most fence-in laws requires ranchers owning livestock to pay for the costs of a fence (Taylor & Geyer 1993). For fence-out laws, the general directive requires neighbours to incur the costs for fences to exclude livestock (Taylor & Geyer 1993).

However, also significant are cost-sharing directives that attempt to preclude persons from receiving gratuitous benefits due to the construction of a fence by one landowner that is used by neighbouring landowners. The third fence-cost option requires neighbouring ranchers, but not non-ranchers, to share fence costs (*Illinois Compiled Statutes Annotated* 1993). This cost-sharing option may be described as a device under which persons benefiting from a fence equitably share in the fence's costs. A common provision declares that whenever an adjoining property owner begins to use a fence previously constructed by a neighbour, this adjoining property owner must pay a proportionate share of the current value of the fence (*Michigan Compiled Laws Annotated* 1991).

A fourth option requires a neighbour and rancher to contribute to the cost of a fence to control the rancher's livestock, generally one half of the cost of a fence, regardless of need (*Nebraska Revised Statutes* 1993). Mandatory cost-sharing despite a person's need has been adopted by one or more states with fence-in or fence-out laws. For states with a fence-in law, instead of a rancher paying the entire cost of a fence on the boundary of property next to a neighbour, the rancher may only need to pay one half of the cost; the neighbour is obligated to pay the other half (*Missouri Annotated Statutes* 1993). Under cost-sharing regardless of need, as defined by some fence-out laws, whenever a neighbour is willing to expend one half of the funds to build a fence, adjacent ranchers are burdened with an equivalent cost (*Colorado Revised Statutes Annotated* 1989).

In a few states in the USA (New York; Vermont), laws foisting fence costs on neighbours were found to offend constitutional mandates. A New York state law was found to violate substantive due process because the imposition of fencing expenses on landowners without livestock lacked a reasonable relationship to any legitimate public purpose (*Sweeney v. Murphy* 1972). Changed circumstances whereby most rural landowners were not livestock owners meant that a Vermont fence law requiring neighbours to help pay for a fence was burdensome, arbitrary and confiscatory (*Choquette v. Perrault* 1989). The Vermont court felt that a law requiring contribution of funds by neighbours was unconstitutional as applied to people who did not own livestock. These cases disclose a judicial re-examination of conflicting property rights with outcomes quite different from previous centuries.

In an economy where many property owners do not need a fence, a legal directive delineating an obligation to pay one half of the cost of a non-needed fence may be burdensome or oppressive. Although courts have upheld cost-sharing directives as serving a public purpose despite the inequity to one landowner (*Holly Hill Farm Corporation v. Rome* 1991), cost-sharing directives raise a political issue that could be addressed by a state legislature to provide a more equitable resolution for landowners who do not want fences. While cost-sharing directives were intended to foster equity, they unduly encourage individuals to erect fences because of the fencing subsidy provided by the neighbour.

Social, ecological, and political reasons may also contribute to the demise of a directive whereby neighbours without livestock bear the cost of a fence to exclude animals. Many people view fence costs as an expense that ought to be borne by those raising livestock. Concerns about the demise of plant and animal species, overgrazing, and the desire for land for new recreational uses create competing interests for some rangelands. The values posited by the land-uses other than livestock production mean that the economic justification for having non-ranchers contribute to fence costs is less pronounced. With the current interest in private property rights, cost-sharing directives, including fence-out rules requiring neighbours to construct fences to exclude livestock,

may come under a new attack by property owners without livestock.

Private property rights

In the past few years, a new private property rights movement has manifested considerable public interest for less governmental interference in the use of private property (Organ 1995; Sugameli 1997). New legislation has been advanced in the US Congress, including US Senate Bill 709 (1997) and US Senate Bill 246 (1999). Several states (e.g. Florida, Idaho, Mississippi, Montana, North Dakota, Texas & Utah) have adopted new laws (e.g. *Florida Statutes* 1998; *Texas Government Code Annotated* 1995; *Utah Code Annotated* 1998). Although the private property rights legislation does not directly affect existing fence laws, the public clamour for the reassertion of private property rights could give impetus to future legislative modifications of existing fence-out rules. In other words, knowledge of property rights could lead to a judicial challenge of an existing fence law.

While most state private property rights laws simply serve as assessment laws, the laws function as a precedent for asserting expectations. The assessment laws require a state official or agency to create guidelines in evaluating proposed state rules with respect to US state and federal constitutional 'taking' implications of private property (*Utah Code Annotated* 1998). As such, these laws basically incorporate existing takings jurisprudence rather than establishing property rights. The significance of the private property rights movement is its support of less governmental interference in private property rights and a new public awareness that previous governmental restrictions on property usage may be modified.

Concerning fence law, the cost burdens imposed by fence-out rules and cost-sharing directives may no longer be accepted as fair. A property rights movement anxious to safeguard private property rights may discover that legislation which foists the costs of livestock production on neighbours without livestock constitutes a candidate for reform. Dissatisfied neighbours, who must erect fences to exclude livestock under a fence-out rule, may be expected to challenge fence-out rules favouring ranchers to secure relief from the expense of fencing. Fence-out rules could constitute an invalid exercise of the police power due to the lack of a legitimate public purpose or lack of a substantial relation to a legitimate public objective. Cost-sharing directives in fence rules constitute a burden that could be found to be unconstitutional under American principles of substantive due process.

Conclusion

Over the past three centuries, fence rules have proved a controversial issue in many areas of the USA. History shows that existing fence rules are not beyond reproach. In the political arena, various interest groups have been successful in advancing rules to augment their property rights. More recently, judicial pronouncements on constitutional rights

and revised public expectations have led to the modification of property rights, including those dealing with fence law. Various social and political issues will continue to transform traditional property expectations.

Leaving the public arena, economic and scientific information also influences decisions regarding fencing regimes. As noted in the discussion of distributional changes and trespasses, uncertainties concerning property rights, new management strategies, changes in land-use, ecological concerns, and undercompensation for trespasses may be advanced to recommend that a fence-out rule or a cost-sharing directive for a particular region be discontinued to achieve a superior resolution of competing interests. All relevant social, scientific and economic criteria need to be fully evaluated to determine the merits for altering a legislative directive for a region.

While changes in fence rules will involve winners and losers, full consideration of regions' long-term objectives and total economies might reveal that changes would be advantageous. One factor that may not have received adequate attention is the use of fences to safeguard ecological and natural resources. In some cases, historic fence rules and economically optimal livestock production fail to support long-term objectives and societal values. The application of scientific findings or management techniques to diminish the denigration of ecological resources or to achieve the sustainable use of range resources may require the demise of fence-out rules and cost-sharing directives in some areas.

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