Financial Returns and Range Condition on Southern New Mexico Ranches

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Generally, as the ecological condition of the range deteriorates under heavy grazing, plant composition in the Chihuahuan Desert shifts toward an increase in forbs and shrubs and a decrease in perennial grasses (Paulsen and Ares 1962). Over the past 7 years a series of studies evaluated grazable forage production on Chihuahuan Desert ranges in excellent, good, fair, and poor ecological condition. These studies in combination with budgets routinely reported by the New Mexico Agricultural Experiment Station over several years provide the opportunity to evaluate financial returns from Chihuahuan Desert ranges in different ecological condition classes and under different cattle price levels.

Methods

Grazable forage production data used in this study were collected from several Chihuahuan Desert ranges in south-central New Mexico (Smith 1993, Holechek et al. 1994). These data were collected from sandy loam upland sites by clipping, drying, and weighing plant materials from several one-half square meter plots per site (40–100) in October during the 1988–1994 period (Figures 1, 2, and 3). Standing crops of current year growth of individual forage species were separated from each other and old growth and are the basis for forage production estimates and range condition determinations. Range ecological condition on each site was determined using the quantitative climax approach developed by Dyksterhuis (1949) and guidelines by the USDA-Natural Resources Conservation Service.

Financial evaluations were based on the budgeted costs and returns shown in Table 1. These values represent the averages for a 250 animal unit ranch on 40,000 acres of land in the Chihuahuan Desert for the 1986 through 1993 period. They are based on annual inch surveys directed by Dr. Allen Torell (Torell et al. 1990, Torell and Hawkes 1995). An additional evaluation was conducted using the same cost structure but using the lower calf prices ($75/CWT, instead of $89/CWT) that prevailed in 1994 and 1995. Financial evaluations were made for 35% above average precipitation conditions (1988–1992) and average precipitation conditions (1993). Assumptions were made that calf crops averaged 75%, calf weaning weights averaged 420 lbs, death losses averaged 3%, and supplemental feed costs averaged $30 per animal in all financial evaluations. These values represent the averages for Chihuahuan Desert ranches. In reality calf crops and calf weaning weights would probably be higher and death losses and supplemental costs lower for ranches in good and excellent condition compared to those in poor and fair condition.

Forage Production Versus Range Condition

Grazable perennial forage production was closely related to range condition (Table 2). The biggest percentage

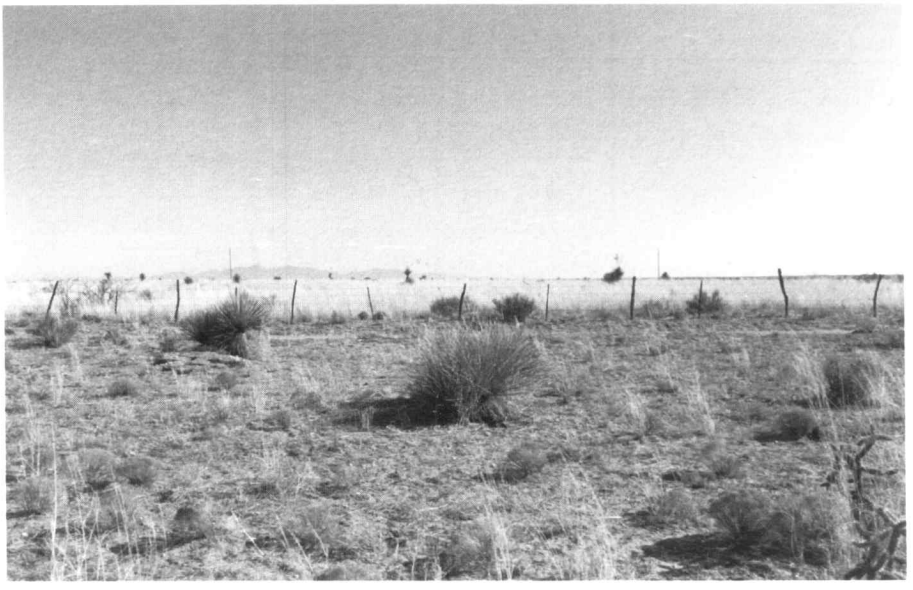

Fig. 1. Chihuahuan desert rangelands (late October, 1991) near Las Cruces, New Mexico in high good condition (background) and in low fair condition (foreground) that were used to evaluate forage production.

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Table 1. Annual average budgeted costs for the average medium sized (250 AU) cow-calf ranch in the Chihuahuan Desert of southern New Mexico in the 1986 through 1993 period.

Livestock type	$/CWT	Gross returns Sale weight (CWT)*	Total ($)	Guideline value ($/AUY)
137 calves	89.00	4.2	51,217	204.84
2 cull bulls	55.00	12.5	1,375	5.50
23 cull cows	42.00	8.0	7,728	30.91
Total ($)			60,320	241.25

Cost type	Production costs Unit	$/Unit	Total ($)	Guideline value ($/AUY)
A. Variable costs				
1. Grazing fees				
State lease	Acre (8,000)	0.59	4,720	18.88
BLM	AUM (1780)	1.86	3,311	13.24
2. Supplemental feed			7,500	30.00
3. Livestock expenses				
2 purchased bulls	Head	1,300	2,600	10.40
Fuel & repairs			4,500	18.00
Veterinary & medicine			1,200	4.80
Property taxes (livestock)			1,024	4.10
Maintenance			2,700	10.80
Other			1,756	7.02
4. Hired labor			0	0
Total variable costs			29,311	117.24
B Fixed costs				
Electricity			1,700	6.80
Telephone			720	2.88
Butane & Heating			1,030	4.12
Insurance			4,200	16.80
Depreciation			9,346	37.38
Property taxes			1,010	4.04
Total fixed costs			18,006	72.02
Total cash costs			47,317	189.26
C. New ranch income** ($)			$13,003	51.99

*Sale weights include 3% shrink.
**No value is subtracted for operator labor and management.

increases in forage occur when ranges improve from poor to fair range condition. Black grama is the primary perennial forage grass in the Chihuahuan Desert. Generally the amount of black grama in the vegetation composition was closely associated with the amount of grazable forage. As range condition on Chihuahuan Desert uplands declines there is progression in the grass component from dominance by black grama (excellent range condition) to dropseeds (good condition range) to threeawns (fair condition range) to fluffgrass (poor condition ranges). Black grama and dropseeds (mesa, sand, and spike dropseed) are excellent cattle forages while threeawns are considered to be of moderate palatability and nutritional value. Fluffgrass is low in productivity and unpalatable to livestock.

Financial Returns Versus Range Condition

The financial data in Table 3 show great differences in returns from excellent, good, fair, and poor condition classes regardless of precipitation conditions or cattle prices. Excellent range condition gives over four times higher financial returns than fair condition range and over 65% higher returns than good condition range. These data show a geometric rather than linear increase in monetary returns as range condition increases from poor to excellent.

In the more humid types the influence of range condition on forage production and financial returns is diminished but still occurs. This is explained by many palatable annuals and short statured palatable perennial grasses (blue grama, buffalo grass) occurring on degraded prairie ranges while bare ground and poisonous plants such as broom snakeweed predominate as range condition declines in the Chihuahuan Desert. In the shortgrass prairie of New Mexico a reduction in range condition from good to fair appears to reduce per acre returns about 15-20% (Holechek 1994) while reductions of 30 to 50% appear likely in the mid-grass and tall grass prairies (Shoop and McIlvain 1971).

Poor condition Chihuahuan Desert rangeland showed monetary losses from cow-calf production under both sets of precipitation and financial conditions (Table 3). When forage production drops below 100 lbs/acre financial losses are likely even under high cattle prices and above average precipitation. This agrees with Stoddart and Smith (1943) who stated that land requiring more than 180 acres to support an animal unit (about 3 animal

Fig. 2. *Chihuahuan desert rangeland (early September, 1991) in excellent condition dominated by black grama that was used to evaluate forage production.*

units per section) was too sparsely vegetated to be used economically. High fixed costs per animal unit under these conditions and the fact that livestock on such rangelands are likely to waste more energy in seeking forage than their gains justify. It might be possible to generate positive financial returns by stocking poor condition ranges with yearling cattle in years with above average winter and spring rainfall but this has not been evaluated.

Range Condition and Ranch Value

Historically corporations in the United States have sold at 15 times their average earnings potential (Gitman and Joehnk 1984). On this basis Chihuahuan Desert cattle ranches would be worth $52/acre if in excellent condition, $32/acre if in good condition, $10/acre if in fair condition, and would be considered a liability if in poor condition. However I recognize factors other than just earnings from livestock determine ranch prices. Life style and development potential can be bigger factors than livestock income in determining what buyers are willing to pay for ranches.

Most Chihuahuan Desert ranches in New Mexico involve large tracts of federal land administered by the Bureau of Land Management and are sold on the basis of animal units specified by the grazing permit. Infrastructure such as fences and watering points are also capitalized into the grazing permit. The relationship between range ecological condition and financial returns is not always understood by ranchers. In many cases I've encountered ranchers who heavily capitalized their ranches with watering points and fence, and then believed they must increase their stocking rates to recover the cost of these investments. This approach can be financially and biologically disastrous if the ranch is in poor or fair condition.

Management Practices and Range Condition

The surest way to improve and maintain range condition in the Chihuahuan Desert is through conservative stocking and proper spacing of watering points (Paulsen and Ares 1962, Valentine 1970, Holechek et al. 1994). It is well documented that stocking rates involving removal of about one-third of current year forage production of key forage species will give meaningful improvement on most ranges. On the College Ranch experimental range in south-central New Mexico this use level resulted in an increase from mid-fair to high good condition over a 25 year period (Holechek et al. 1994). On an adjacent Bureau of Land Management range conservative stocking over a 10 year period resulted in condition improving from poor to mid-fair.

The Chihuahuan Desert range in highest condition (mid-excellent) that we studied had a long history of conservative stocking in combination with a best pasture rotation grazing system. It supports an almost pure stand of black grama and produces nearly 1,000 lbs/acre of perennial forage in most years.

A 3 mile spacing of watering points may have some advantages for Chihuahuan Desert rangelands in poor or fair condition. This spacing of watering points is farther apart than the commonly recommended 2 miles. However it minimizes the amount of sacrifice area that often results from continuous grazing at moderate or heavy stocking rates. It provides a forage reserve that can be beneficial to livestock and wildlife when drought occurs. Since the number of watering

Table 2. Grazable perennial forage production from Chihuahuan Desert ranges in excellent, good, fair, and poor ecological condition under above average and average precipitation conditions.

	Range condition			
	Excellent	Good	Fair	Poor
Forage production under above average ppt. conditions (1988-1992) (lbs/ac.)[1]	910	597	260	65
Forage production under average ppt. conditions (1993) (lbs/ac)	764	501	210	55

[1]Growing season precipitation in the 1988 through 1992 period was 35% above the long term average.

Table 3. Financial returns ($/acre) from Chihuahuan Desert ranges in excellent, good, fair, and poor ecological condition under different precipitation conditions and cattle prices.

	Range condition			
	Excellent	Good	Fair	Poor
	---------- ($/acre) ----------			
35% above average precipitation ($89/CWT calves)	+$4.26	+$2.64	+$0.89	-$0.12
35% above average precipitation ($75/CWT calves)	+$2.82	+$1.68	+$0.47	-$0.22
Average precipitation ($89/CWT calves)	+$3.49	+$2.14	+$0.67	-$0.16
Average precipitation ($75/CWT calves)	+$2.27	+$1.33	+$0.32	-$0.25

points on a 40,000 acre ranch is reduced from 20 to 12–14, the annual costs of watering point maintenance is reduced by about $1500. In addition the operator has reduced the amount of capital tied up in watering points by about $36,000. This can mean less debt to service and higher available capital during periods of adversity when low cattle prices and drought prevail. A 2 to 2½ mile water point spacing works best on ranges in high good or excellent condition managed under rotation schemes that permit sacrifice areas to recover.

Rotation of access to watering points is a proven way to maintain perennial grasses around watering points. On southern Arizona range Martin and Ward (1970) found watering point rotation nearly doubled the yield of perennial grasses over a 8 year period with little cost for labor or fence.

Wildlife and Range Condition

We have intensively studied wildlife populations under different ecological conditions in the Chihuahuan Desert. Our studies have consistently shown good range condition with 60–65 percent remaining climax to maximize wildlife diversity (Saiwana 1990, Smith 1993). Generally desirable wildlife such as quail, pronghorn, songbirds, and cottontail rabbits occur in low numbers on both excellent and poor condition ranges. Good range condition appears to be particularly favorable for pronghorn while mourning doves and scaled quail numbers have been similar on fair and good condition ranges.

Some ranchers in the Chihuahuan Desert generate significant income from hunting and viewing of wildlife (Butler and Workman 1993). On federal lands, the Bureau of Land Management is mandated to practice multiple use. Our research indicates that Chihuahuan Desert range in high good ecological condition gives a good balance between forage for livestock and habitat for wildlife.

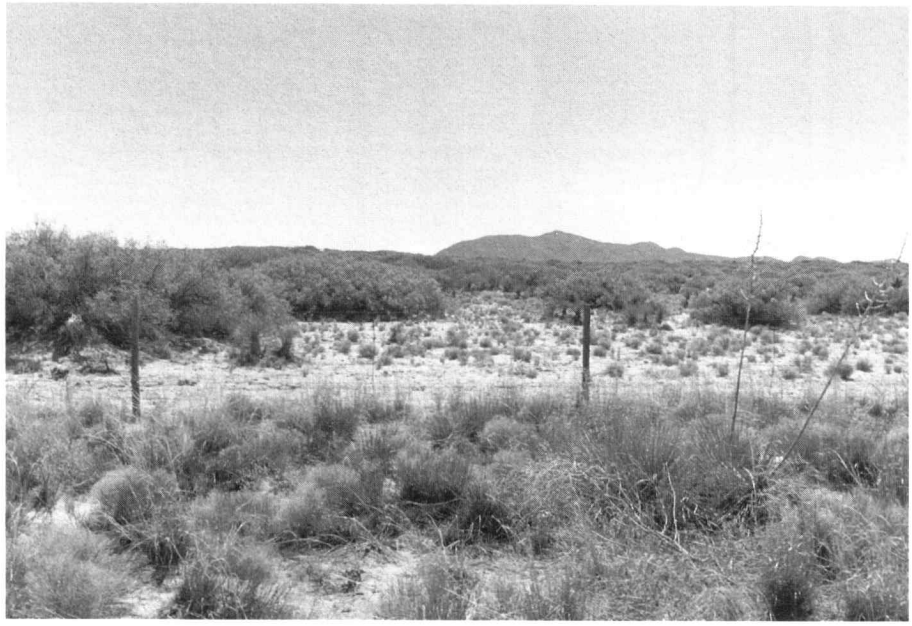

Fig. 3. *Chihuahuan desert rangelands (late October, 1991) in poor condition (background) and in high fair condition (foreground) that were used to evaluate forage production.*

Summary

Forage production and financial returns were evaluated over a 7 year period on New Mexico Chihuahuan desert ranches in poor, fair, good, and excellent ecological condition. Both forage production and net financial returns were greatest on excellent condition ranges and lowest on those in poor condition. Maintaining Chihuahuan desert rangelands in high good ecological condition gives a good balance between provision of forage for livestock and maintaining habitat for desirable wildlife. Removal of about one third of the annual production of primary perennial forage grasses will permit most Chihuahuan desert ranges to improve from fair to high good condition.

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