AN ECONOMIC ASSESSMENT OF PRICKLYPEAR MANAGEMENT IN SOUTH TEXAS

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Range resources are vital components of most successful ranch businesses. All such resources are interrelated and cannot be managed separately if total ranch goals are to be attained. Range management programs use forage resources for the highest and best uses, coordinate these uses for optimum enterprise performance, maintain or improve the resources, and contribute to the achievement of ranch goals.

Management is the key to doing the right things, together, to make all ranch operations successful in spite of crises such as drought, poor markets, or high interest rates. The resources available to management, however, occur in different quantities, qualities, and combinations among ranches. Therefore, the best range management program is based on a thorough resource inventory and identification of technically feasible alternatives that provide an economic basis for decision-making. This concept is termed Integrated Range Resource Management Systems (IRRMS). This interdisciplinary process can be applied to management decision-making involving manipulation of pricklypear communities and the use of pricklypear as a beef cattle forage.

Most South Texas ranches are primarily cow/calf operations but may also diversify with stocker cattle and other enterprises (e.g. wildlife). Management decisions, therefore, must be based upon the needs of both the livestock and wildlife enterprises and maintaining an optimum mix of range resources. South Texas and northeastern Mexico have semiarid to subhumid climatic environments; thorny brush is the predominant vegetation type. Grass is a precious resource over much of the region since desirable climax grasses (i.e. plains bristlegrass, pink pappusgrass, and windmillgrasses) have been heavily grazed over long periods of time and are relatively scarce. Some range sites support sodgrasses such as curlymesquite or buffalograss. Brush species such as guajillo, colima, guayucan, and others provide some quality browse for livestock and wildlife during the year. Overall forage production and quality is low with consequent low livestock carrying capacities.

Many thousands of brush-covered acres have been converted into grassland (primarily Buffelgrass), which can be maintained during years of above normal rainfall but are stressed during frequent droughts. Carrying capacities, based on the estimated forage production of the introduced grasses, fluctuate widely between years. Thus, ranchers are often confronted with severe drought that endangers the livestock enterprise. When this occurs, they have to sell the livestock, when, often, neither the stock condition nor market prices are favorable, or they have

to buy supplemental feed for the stock. Brush species also immediately begin to reinvade cleared and seeded areas and maintenance treatments must be initiated.

These realities should be considered in land management decisions. Range vegetation should be manipulated so that a diverse species composition is maintained to meet specific goals and objectives. Pricklypear is a definite, important part of this flora and should be a part of the forage system but the pros and cons of such a management system should be carefully considered.

Pricklypear does have several undesirable qualities. Dense pricklypear stands interfere with the handling and movement of livestock, utilization of forages, and compete with desirable herbaceous plants. "Pear-eaters" (habitual consumers of pricklypear) may develop in the herd and spines can cause bacterial infection in mouths and the gastrointestinal tract. Seeds may cause rumen impaction but these problems occur mainly in sheep and only rarely in cattle. These disadvantages not withstanding, wildlife and emergency livestock feed values are the reasons over 60% of South Texas ranchers believe pricklypear enhances ranch productivity. Pricklypear is very important in the diet of white-tailed deer, javalina, and other wildlife species and provides good screening cover for bobwhite quail. It also provides emergency livestock feed in times of stress.

Thus, a rational management plan, based upon goals and objectives and grounded in economics, must be developed that considers the presence of pricklypear and its net value. The plan should consider livestock health problems, herbaceous forage production and utilization, and economics. If some pricklypear control is necessary, management decisions must include how much to remove; where and in what configuration to remove it; and the control method to employ. Conversely, if stands are too sparse, procedures can be initiated to increase densities and/or size of the stand. Another planning consideration is that of preparation and feeding of pricklypear to livestock.

Control, Cultivation, and Use

The amount, density, and distribution of pricklypear needed and desired on each ranch will vary. A cow can consume 10% or more of her body weight in cactus per day. If a cow needs 8-10 kg of dry matter in her diet, eating 45 kg (fresh weight) daily will provide for these needs. Rangeland supporting 20 metric tons of pricklypear (natural or planted) per hectare will provide for the needs of one cow for one year. This also considers that not over 66% of a pricklypear plant should be browsed during the year. A three-year recovery period for the plants should be provided, so a three-year forage reserve would necessitate the use of three hectares per cow in the reserve forage program. Similar calculations can be applied to forage availability in stands of pricklypear scattered over the ranch. An inventory of available pricklypear resources can then be matched with production goals and appropriate management directions selected. A similar procedure is necessary for wildlife considerations.

Control

Pricklypear densities may change dramatically over time as pricklypear canopies can increase at a rate of 25% to 33%/year. Dense pricklypear stands may be considered problem areas and some control may be desirable. Several effective methods exist to control pricklypear if necessary. The choice depends on size of pricklypear plants, density of plants, availability of hand labor, associated vegetation, and financial resources that may be committed to control efforts.

Pricklypear on rangeland can be effectively controlled with prescribed burning; hand grubbing; mechanical methods such as chaining, railing, or rootplowing; or herbicides. Mechanical treatments usually aggravate a pricklypear problem by spreading and increasing stand densities. However, dragging (railing) under proper conditions will reduce pricklypear stands. This method was developed on the Rio Grande Plains to control pricklypear. Aerial and ground broadcast spraying of herbicides, particularly picloram, or prescribed burning followed by spraying with a reduced rate of picloram is effective. Picloram may also be mixed with clopyralid, triclopyr, and other herbicides for increased control of associated brush species.

Pricklypear response to herbicide applications may vary, because of changes in weather subsequent to treatment or variation in the pricklypear populations themselves. Labeled picloram rates range from 0.28 kg/ha to 0.56 kg/ha in Texas and applications of 0.56 kg/ha picloram/acre in the autumn months is usually adequate for effective pricklypear control. A prescribed burn one to three years after picloram spraying has also been effective in maintaining the original level of control.

Prescribed burning under very hot conditions and/or with heavy fine-fuel loads may provide sufficient control to meet management objectives. However, it is difficult to accumulate adequate fuel under dense pricklypear stands. Burning alone usually kills most of the pads but many clumps will resprout and regrow to its original size in 3 to 5 years.

Cultivation

Proper grazing management of range vegetation, even under relatively inflexible systems of range deferment, has resulted in better grass production and higher animal carrying capacity in South Texas. However, grazing programs need to be very flexible since carrying capacities will decline during droughts. A few South Texas cattle ranchers have been growing substantial numbers of hectares of pricklypear (5 percent of the ranch) for use as an emergency forage. These are planted in rows at 5 meter intervals to facilitate preparation for feeding. Purposefully planted and cultivated pricklypear is stable and easily produces 20.0 metric tons of biomass per hectare whereas range grass production will vary but will seldom produce more than 4.0 metric tons of forage per hectare.

Nitrogen and phosphorus fertilization can be used to increase the productivity and nutritive value of pricklypear. Total biomass production has increased approximately 5-fold 7 years following planting under a fertilization program and cactus nutritive values have been significantly elevated.

Use As A Forage

Pricklypear cactus has been utilized as a supplemental and emergency forage for cattle and other grazing livestock in Texas and northern Mexico for over 150 years. It is still an important emergency feed resource for beef cows and stocker cattle and has allowed many ranches to survive extended drought periods. A 1988 Texas Agricultural Extension Service survey indicated that 40% of Rio Grande Plains ranchers feed pricklypear as a nutritional management practice.

Managers should evaluate their pastures and begin burning pear as a supplement before grasses are depleted. Extended dry periods often last until all the grass resources have been totally utilized and pricklypear then becomes a primary source of nutrition instead of a supplement. Pricklypear is high in energy but low in protein so salt and cottonseed meal protein supplement has to be fed with pricklypear to meet the nutritional requirements of beef cows. Cottonseed meal's high protein and phosphorous content complements pricklypear's highly digestible carbohydrates (energy), vitamins, and water.

Depending on availability of labor, supply of cactus and cost of fuel, pricklypear may be fed in place by singeing off the spines with a "pear burner" and letting livestock eat what they desire. Pricklypear is "burned" by: (1) carrying an individual pear burner and moving from plant to plant; (2) carrying a propane tank in the back of a pickup and burning with a long hose and burner (this requires one person to move the hose and one to burn); or (3) pulling a tank with several burners behind a farm tractor or some other special equipment. It may also be fed in troughs after chopping, windrowing, and singeing the spines.

A 5-gallon pear burner will hold about 4 gallons of propane and will usually provide one day's feed for about 14 cows in dense pricklypear. A gallon of propane will normally feed from three to five cows but this depends upon weather conditions and size of nursing calves. In warm, dry weather an experienced person can readily burn enough pear for 200 cows or more in a day.

Vegetation Responses to Management

An example of a pricklypear management system was initiated on rangeland in South Texas in November, 1986. The original vegetation was a typical *Prosopis* - *Acacia* mixed brush community when the pastures were rootplowed in 1980 and seeded to Buffelgrass. Some woody regrowth had occurred by 1986 but pricklypear had increased and dominated the community (approximately 15,000 kg/ha, wet weight) when the pastures were aerially sprayed with 0.28 kg/ha (half rate) and 0.56 kg/ha (full rate) of picloram. There were no important differences between the two rates in numbers of plants controlled, but the full rate controlled pricklypear faster than the half rate. The two rates had achieved very similar results after the third year. Approximately 20% to 40% of the pricklypear canopy remained three years after the picloram treatments. Slightly more canopy cover remained on the half rate area and this resulted in more residual biomass than on areas sprayed at the higher rate. It was estimated that the nonsprayed areas supported over 18,000 kg/ha (wet weight) of pricklypear. Almost 8,000 kg/ha and 4,000 kg/ha of pricklypear remained three years after spraying with the half and full rates of picloram, respectively.

Lowered pricklypear densities significantly increased grass production in the treated pastures (Figure 1). An average of 1,000 kg/ha grass forage was produced on nontreated areas and this doubled during periods of good rainfall. However, grass forage production increased to 4500 kg/ha and 5500 kg/ha, respectively, on areas treated with the two rates of picloram. These increases in forage availability allowed for improved cattle-carrying capacities. When grass increases are combined with residual pricklypear biomass, cattle-carrying capacities may be increased even more in good years and maintain a buffer to ameliorate the impact of droughts

In this example, by assuming an Animal Unit needs 9 kg of dry forage daily and with a grazing efficiency of 25%, the different pastures were relatively equal prior to treatment. The first year postapplication (1987) was wet with good grass responses in all treatments. Grazing capacities doubled on the control area but quadrupled on the half-rate treatment and increased 7-fold on the full rate treatment. However, the following year (1988) was a drought year and forage on the control area dropped to pretreatment levels. Production on the half-rate treatment also dropped but was still greater than the control, whereas the pasture treated at the full rate continued to support triple the original grazing capacity. The second year of the drought (1989) allowed only 1/5th the original amount of grazing in the control pasture; the same as the original on the half-rate treatment; and double the original on the full-rate treatment. Over the 3-year period, average grazing capacities remained low in the nontreated pasture, whereas grazing capacities doubled and tripled on the treated areas (Figure 2).

Simultaneously, pricklypear populations also changed and affected total forage quantities. An Animal Unit will consume up to 45 kg of prepared, fresh pricklypear daily. Thus, with increasing pricklypear densities, grazing days in the control pasture also increased (Table 1). Lowered pricklypear biomass on the pasture with the half-rate treatment dropped the carrying capacity by almost half, whereas grazing capacities in the pasture with the full-rate treatment fell by a factor of four.

There are several tradeoffs in these scenarios. A lack of pricklypear control results in "boom and bust" grass responses between wet and dry years with relatively stable pricklypear production. To take advantage of this situation, traps or small pastures might be maintained with large amounts of pricklypear or it may be planted in rows in pastures as a nutrient bank for emergency situations. However, in dense pricklypear communities, greater biodiversity will exist when pricklypear competition is lessened by herbicide treatments. Grass responses and grazing capacities are more stable since, although fluctuations in total forage production do occur, they are not as drastic. Sufficient pricklypear residual remains to use as an emergency feed following picloram applications. Comparative vegetation responses indicate that 0.28 kg/ha of picloram is sufficient to maintain higher carrying capacities on grass as well as adequate pricklypear reserves.

Table 1. Changes in Grazing Capacities (A.U. Days/ha) following Treatment of a Pricklypear Community with Picloram.

	Treatment		
	Control Pricklypear**	0.28 kg/ha Picloram Pricklypear	0.56 kg/ha Picloram Pricklypear
1986 (Pretreatment)	326	326	326
1987	393	326	262
1988	393	217	86
1989	393	175	86
X	393	239	145

** Calculated on 45 kg pricklypear daily.

The Economics of Pricklypear Management

In order to make sound management decisions with respect to pricklypear the ranch manager needs to estimate: 1) the value of grass production that may be lost to dense stands of pricklypear, 2) the value of pricklypear as an emergency feed, 3) the value of pricklypear to wildlife habitat. These values should be considered in relation to costs of preparation and use as a feed source.

Economic feasibility of pricklypear stand reduction was analyzed using capital budgeting techniques. Two capital budgeting methods, payback period and internal rate of return (IRR), were applied to determine the economic feasibility of picloram application to pricklypear.

The first step in the analysis was the identification of alternative investment possibilities. The second step required the accurate specification of projected cash flows for the identified alternative investment possibilities. The changes in cash flows relative to nontreated pastures were calculated for 100 hectares over a three-year period to compare alternative pricklypear control strategies. Initial cash outflows were for material and application costs of $38.29/ha for the half rate treatment and $56.81/ha for the full picloram treatment. Revenue flows for the alternative treatment strategies were calculated by multiplying the estimated change in carrying capacity by $98.28, the weighted average total economic grazing costs/cow. It is likely that both treatments increased the value of the property's use for hunting by partially opening up the dense pricklypear canopy. Tables 2 and 3 show the sensitivity of both the payback period and IRR analysis to varying levels of changes in the value of the property for hunting use in conjunction

with changes in livestock carrying capacity. The cash flows from the alternative investments along with their accompanying payback periods and IRR are also shown.

Table 2. 0.28 kg/ha Picloram Application Economic Analysis per 100 ha.

Increase in Hunting Lease Revenue per Hectare	1986	1987	1988	1989	Payback Period (Years)	Internal Rate of Return
$0.00	($3,828.50)	$1,474.20	$98.28	$687.96	5.08	-25.59%
$2.47	($3,828.50)	$1,721.20	$345.28	$934.96	3.83	-12.68%
$4.94	($3,828.50)	$1,968.20	$592.28	$1,181.96	3.07	-1.26%
$7.41	($3,828.50)	$2,215.20	$839.28	$1,428.96	2.56	9.22%
$9.88	($3,828.50)	$2,462.20	$1,086.28	$1,675.96	2.20	19.04%
$12.35	($3,828.50)	$2,709.20	$1,333.28	$1,922.96	1.93	28.37%

Initial investment at $38.29 per hectacre.

Table 3. 0.56 kg/ha Picloram Application Economic Analysis per 100 ha.

Increase in Hunting Lease Revenue per Hectare	1986	1987	1988	1989	Payback Period (Years)	Internal Rate of Return
$0.00	($5,681.00)	$2,260.44	$786.24	$884.52	4.34	-19.22%
$2.47	($5,681.00)	$2,507.44	$1,033.24	$1,131.52	3.65	-10.60%
$4.94	($5,681.00)	$2,754.44	$1,280.24	$1,378.52	3.15	-2.71%
$7.41	($5,681.00)	$3,001.44	$1,527.24	$1,625.52	2.77	4.65%
$9.88	($5,681.00)	$3,248.44	$1,774.24	$1,872.52	2.47	11.62%
$12.35	($5,681.00)	$3,495.44	$2,021.24	$2,119.52	2.23	18.28%

Initial investment at $56.81 per hectacre.

In this instance, the full-rate treatment would be the preferred investment with no increase in hunting lease values per hectare. However, as soon as the increase in hunting lease values reach $4.94/ha, the half-rate application rate becomes the preferred investment.

Internal rate of return (IRR) is another capital budgeting technique. To find the preferred investment from a group of alternative possible investments when using the IRR capital budgeting technique, the investment alternative with the largest internal rate of return is chosen. If the preferred investment alternative has an IRR that is higher than the decision-maker's required rate of return on investments, the preferred investment would be accepted. In this particular case, IRR capital budgeting analysis gives consistent results with payback period analysis. The IRR results would exclude both the herbicide rates unless either application could result in an increase in hunting lease values of at least $7.41/ha. At this level of improvement in hunting lease values and above, the half rate would also be the preferred investment.

The Economics of Feeding Pricklypear

The cost of using pricklypear as a feed depends upon several factors. These include the quality of the pricklypear, the density of the stand, the equipment used to prepare it for feeding, and the cost of fuel required to singe the spines from the pricklypear. Propane is the primary fuel used to "burn" pricklypear and has a sharply defined seasonal price pattern. Prices are lowest in the summer and highest in winter months primarily due to competing demands from residential and industrial heating uses. Propane prices can vary from $0.40 to $0.80/gallon during a year. South Texas producers have reported usage rates ranging from 0.2 to 0.33 gallons of propane/cow/day to prepare pricklypear for feeding. Fuel at these rates would cost from $0.10-$0.16/day up to $0.16-$0.26/day during periods of seasonally strong propane prices. Labor required to prepare pricklypear also varies widely, from one man being able to prepare sufficient feed for 125 cows in 0.5 day to two men being able to prepare enough for 400 cows/day. Assuming a wage rate of $5.00/hour plus a 25% charge for employment taxes and other benefits, labor costs would range from $0.20/head/day to $0.25/head/day. Repairs required to keep burning equipment in service normally range from $75 to $100 per year. These repairs would include replacing hoses along with changing burner coils.

These values would lead to cost estimates of preparing pricklypear for feeding that would range from $0.30/head/day to $0.41/head/day depending on the factors discussed above. These cost estimates do not represent all the costs involved in a total feeding program. Other sources of protein such as supplements containing cottonseed meal, corn and salt along with low moisture roughage (i.e. Coastal Bermuda hay) need to be fed along with pricklypear.

The following case study shows how pricklypear has been used as the basis for a stocker cattle operation in South Texas. The data was obtained from a stocker cattle operation in Webb County, Texas. In this enterprise, 1028 head of cattle with an average weight of 465 lbs were placed on two 1000 acre pastures on January 1, 1993. Pricklypear was the primary forage in these pastures. The cattle were fed by burning pricklypear, with approximately 2.6 lbs of supplemental feed per day to meet cattle nutritional requirements.

The performance of this stocker cattle enterprise over this winter-spring period was acceptable. On April 12, 1993, and April 20, 1993 a total of 1021 head weighing an average of 545 lbs were shipped off the pastures. Death loss (0.68%) was quite low. The surviving cattle had an average daily gain of 0.7 lbs/head/day. Propane costs were $0.13/lb of gain, labor and equipment costs were $0.13/lb of gain and supplemental feed costs were $0.27/lb of gain. Total direct cash costs per pound of gain were $0.53/lb (Figure 3).

The stocker cattle enterprise's gross margin was analyzed. The original purchase price of the cattle was $94.00/hundredweight, with a net purchase cost of $437/head. Direct cash costs for the enterprise included $10,319.68 for propane, $21,285.28 for supplemental feed and $10,345.00 for labor and equipment for total direct cash costs of $41,949.96. The ending value of the cattle was estimated to be $97.00/hundredweight, given improved market conditions for stocker cattle between January and April 1993. The net value of the cattle weighed off the pastures was $529/head, for a total production value of $539,752. The enterprise's gross margin was $48,559, or $47.57/head (Figure 4).

The gross margin for the stocker cattle enterprise can be subdivided into grazing and marketing margins. The grazing margin is calculated using the sales price, the enterprise cost of gain and net gain of the cattle. The grazing margin can be used as a measure of the economic efficiency of the enterprise, with large positive values for grazing margin being preferred. The marketing margin can be used to isolate the effects of changes in market conditions on the enterprise gross margin. The marketing margin is calculated using the sales price, purchase price and initial weight. The grazing margin for the enterprise was calculated to be $33.62/head, with the marketing margin calculated as $13.95/head.

The grazing margin may then be further subdivided to estimate the value of pricklypear to the stocker cattle enterprise. This grazing margin analysis suggests that roughly $33.62/head can be attributed to the enterprise's use of range, general overhead, opportunity cost of capital, and management resources. To arrive at a residual value for the range (pricklypear) contribution, the general overhead, opportunity cost of capital, and management costs have to be subtracted out of the grazing margin. Using an annualized rate of 3% for the cost of capital calculation, the opportunity cost of capital used for cattle purchase, fuel, supplemental feed, equipment, and labor would be $4.12/head. If one assumes that general overhead and management costs are $5/head and $10/head, respectively, this would leave a residual return to the range resources, before tax, of $14.50/head. Using this enterprise's average stocking rate of 1.95/acre, the value attributed to the range (pricklypear) is $7.44/acre. Using the average grazing days that each stocker was pastured would give a return to the range (pricklypear) resource of $0.134/head/day.

For comparison purposes, rough figures were obtained for pasturing calves on irrigated oat pastures during the winter of 1993. Pasture costs for one acre of irrigated oats was generally quoted at $125/acre for 150 days of grazing. Stocking rates of 600 lb/acre on these type pastures generally obtained 2 pounds of gain per day. Salt and mineral costs over the grazing period were reported to average $5.00/head, with custom care reported at $8.00/head. If 1028 calves weighing 465 pounds were pastured on these oats, they would require approximately 800 acres. Pasture costs would then total $72,000, with $5,140 of salt and mineral and $8,224 of custom care, for total variable costs of $85,364. Assuming the same percent death loss, after 108 days the cattle would have gained 216 lb/head, for a total gain of 220,536 pounds. The cost of gain would then be $0.3871/lb, versus $0.53/lb cost of gain for the pricklypear feeding program. While the pricklypear cost of gain is higher, it is still a profitable option.

Management Implications

A diversified ranch firm tends to be more stable, more productive, and is better able to meet ownership and managerial goals than single enterprise, nonintegrated operations over a long-term planning horizon. This diversity also is important in regards to range resources. Biodiversity lends stability to the functioning and use of these resources. The inclusion of pricklypear cactus in range management strategies thus has important management implications.

The absence or total removal of pricklypear would undoubtedly damage wildlife habitat and negatively impact several species' populations. Ethical questions aside, this would adversely affect revenue that could be generated from hunting leases. Properly managed pricklypear stands can add value to wildlife leasing enterprises, an increasingly important source of revenue to ranch operators.

Pricklypear can also serve as a cost-effective feedstuff for cattle. Grass is the preferred class of plants in the diets of beef cattle but, with some supplemental feed, they can do well on a diet of pricklypear. The stocker cattle example shows that feeding pricklypear can be economically efficient in South Texas. However, just as a monoculture of Coastal Bermudagrass has deficiencies and disadvantages for beef cattle grazing, so does pricklypear. The dependence upon single-species forage production should be discouraged. Normally, beef cattle should be allowed a diverse diet of grass, forbs, brush, and cactus. During drought or winter when grass supplies are low, a greater reliance on pricklypear may be necessary.

The attainment of varying levels of biodiversity can be satisfied by pricklypear control or cultural practices. It is clear that use-values of land with extremely dense stands of pricklypear can be feasibly increased by picloram applications. If, by opening up the pricklypear canopy, hunting lease values can be increased by $5.00 to $8.00/ha and livestock carrying capacities also increase, controling pricklypear with picloram becomes economically feasible. It is generally advisable to treat dense pricklypear stands with 0.28 kg/ha of picloram in order to decrease pricklypear stand canopies and grow more grasses. Livestock carrying capacities can be doubled during good rainfall years by reducing pricklypear densities and lessening competition for forage grasses. Forage grass response is immediate but is highly dependent on rainfall. This forage base declines during drought years with concomitant reduction in livestock carrying capacity. However, a forage base remains in the form of pricklypear since 100% mortality is improbable. The residual pricklypear can add many additional Animal Unit days/ha to ranch carrying capacities. Preparation and supplemental feeding of pricklypear will add to the costs per cow but may avoid herd liquidation during extended droughts.

There should be some pricklypear present in each pasture as part of the range vegetation. However, if supplies are low, stands can be increased by mechanical means. Pricklypear can also be planted in rows on strategic sites in each pasture. A fertilization regime is also an option.

It is generally advisable to locate a "pear ground" in small traps or pastures in order to better control livestock access and consumption. These nutrient banks can facilitate preparation, feeding, waterings, and supplemental feeding in such a nutritional program. Size and location will depend upon the total program, numbers of animals, density of the stand, and other factors. The philosophy of the manager on whether his forage program is cactus-based, grass-based, or a combination of the two underpins the decision process.

Pricklypear cactus management is economically feasible as a component of forage systems. Such management systems definitely are an important option on the drought-prone, mixed-brush rangelands of South Texas.

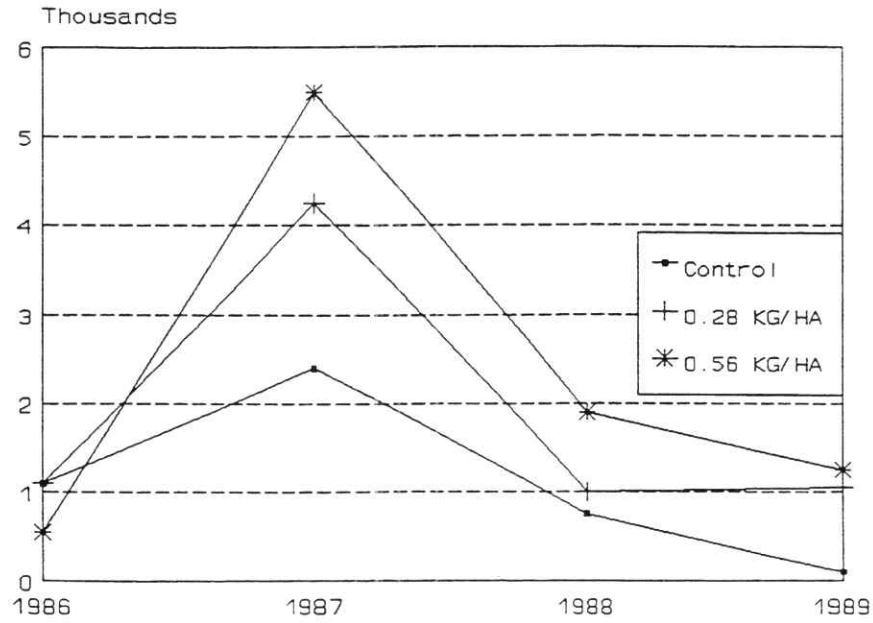

Figure 1. Grass production (kg/ha) on picloram-treated and nontreated rangeland.

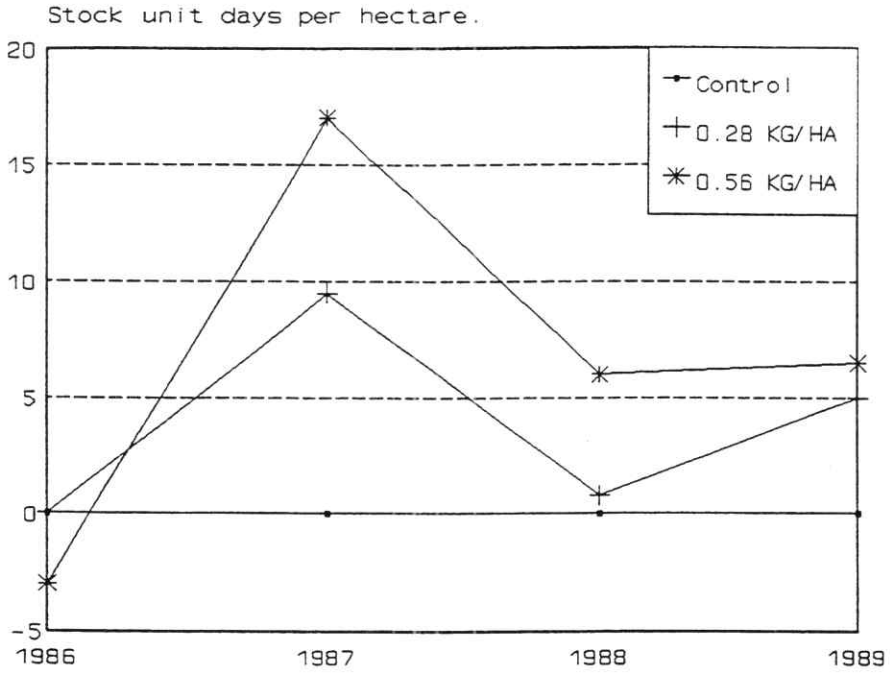

Figure 2. Beef cattle carrying capacity changes (stock unit days/ha) in the grass forage base after pricklypear treatment with picloram.

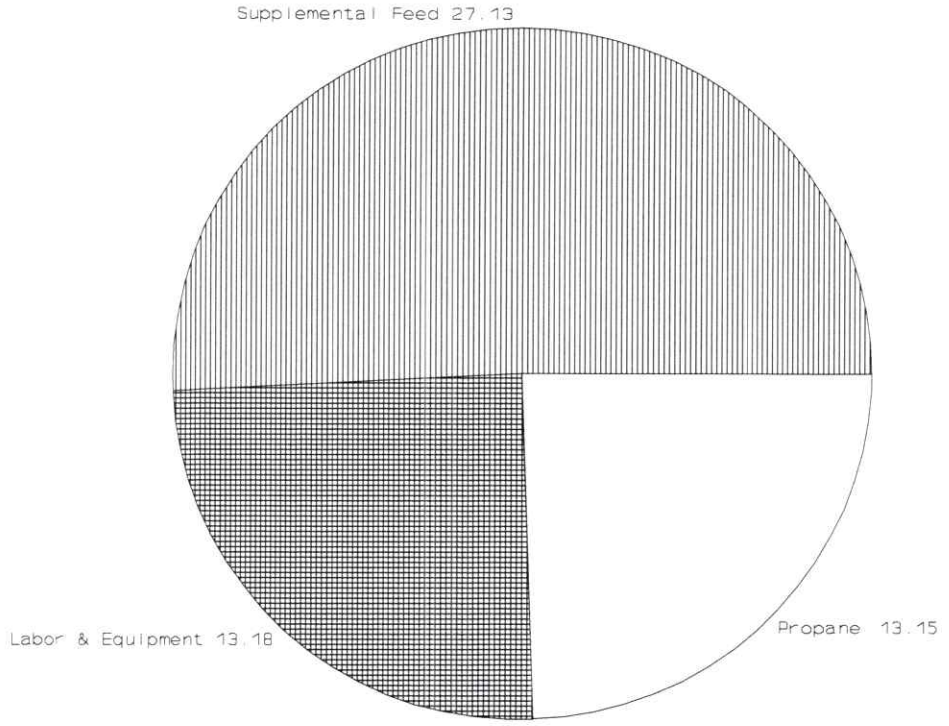

Figure 3. Stocker steer cost of gain (per pound) on pricklypear pasture.

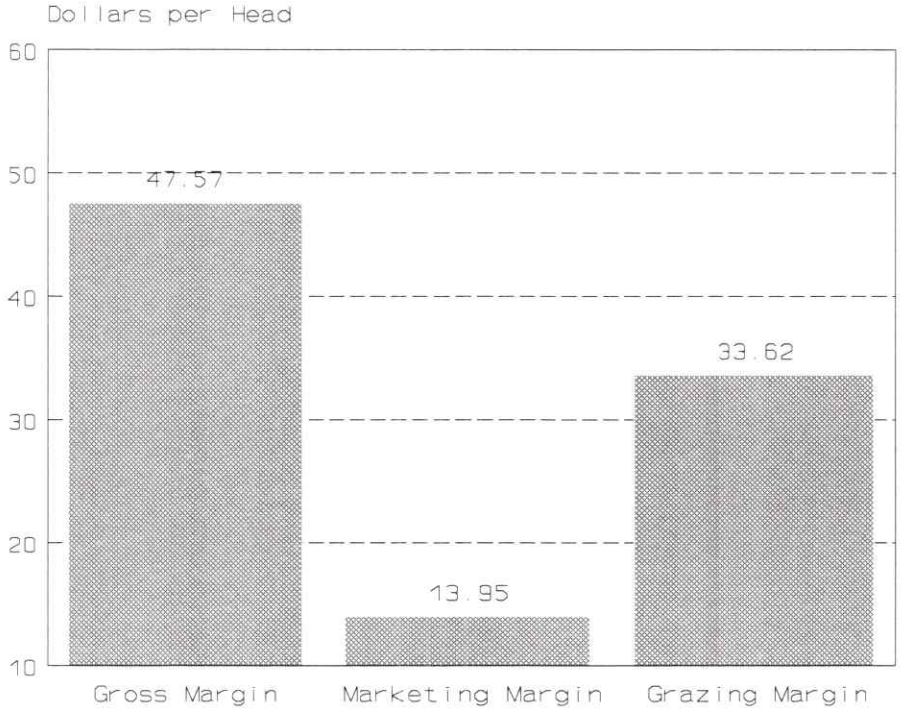

Figure 4. Gross, marketing, and grazing margins for feeding stocker steers on pricklypear.