Commercialization of Wild Game Ranching: Enterprise Budgets

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COMMERCIALIZATION OF WILD GAME RANCHING:
ENTERPRISE BUDGETS

by

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EXECUTIVE SUMMARY

A relatively recent suggestion for agricultural diversification in Utah has been the development of commercial "elk" ranching. This type of an operation would require action by the state's legislative bodies since it is presently not legal to raise "wild game" in a commercial environment. That legislation is expected to be introduced in January of 1997 for consideration. There are a number of issues related to "wild game" ranching that are of some importance to the state's population including: (1) economic viability of such enterprises, (2) genetic contamination, (3) disease transmission, (4) increased poaching activity, and (5) reduced access to private land hunters. At the request of the Utah Farm Bureau, an analysis of the economic viability of "elk" ranching was undertaken. The results of that analysis are contained in this summary report. The other issues identified above were not examined as part of this study.

Wild game ranching is an agricultural-related business that is quite new in North America, though other areas of the world have carried on such enterprises for centuries. In North America, the leading production area is in the provinces of Alberta and Saskatchewan, Canada, with Colorado providing the major U.S. production. Since wild game ranching began in North America, 75-80% of the revenue have resulted from the production and sale of breeding stock, followed by velvet sales. Meat production currently provides little revenue to wild game ranchers.

Breeding stock currently sells from $4,500/head for bred yearlings to over $6,000/head for bred cows. Breeding bulls sell for up to $5,000/head. Velvet production, which is the next most profitable elk enterprise, typically is produced by mature bull elk and has sold for between $35 to $115/pound, though current prices range between $55 and $60/pound. Venison, which is sold in some specialty restaurants, brings between $1.90 to $2.00/pound live weight.

Other potential revenue sources, in addition to breeding stock, velvet, and venison, include hunt bulls, specialty products (jerky, etc.), and head and cape sales for mounting. None of the "other" revenue sources were included in this analysis because price and production data are extremely limited.

Initial investment cost include land, pasture improvement, fencing, handling facilities, squeeze chute facilities, watering equipment, truck with stock trailer, tractor and loader, freezer space (for the velvet), and breeding stock. Not all items have to be purchased in year 1 and many purchases are made as late as year 6 or 7. Following a schedule considered to be adequate for the
development of the elk enterprise, the initial investment would range from $115,000 to over $130,000, with additional purchases occurring in later years. Two scenarios were considered in this analysis: (1) the purchase of 80 acres and new equipment and (2) the purchase of 80 acres and used equipment. Under Scenario I, positive returns were not realized until year 9, while under Scenario II, positive returns were achieved after year 8.

This analysis may be considered pessimistic for at least three reasons. First, it is highly unlikely that someone would start fresh with a purchase of 80 acres of highly productive irrigated pasture land. Since we are talking about alternatives to traditional agricultural enterprises, land and many of the other required resources would likely already be owned. Hence, the opportunity cost of land may not be that equivalent to land purchased new. Second, if any of the needed resources are used for other agricultural enterprises, then there is no reason to allocate the full cost of the land, facilities, and equipment to the elk operation. For instance, if cows were also being raised, expenses related to the truck and trailer and tractor and loader could also be utilized in existing activities, thereby reducing the portion of the cost that should be attributed to the elk operation. Third, a different investment pattern would result in a different cash flow and investment obligation. In this analysis, it was assumed that all animals were kept for velvet or breeding stock until the numbers reached the desired level. A slower expansion, whereby some calves and/or yearling animals would be sold rather than retained, would result in lower interest costs, one of the major cost categories for this enterprise.

There are also several reasons why this analysis should be considered optimistic. First, this whole analysis is based on the assumption that the most profitable output is breeding stock, followed by velvet production. As long as the prices for breeding stock remain as high as indicated herein, then the enterprise should be profitable. However, it is widely argued (even by Renecker) that this “breeding stock” market will exist for approximately 10 years. As the industry matures, the market for breeding stock will become less and less profitable. Hence, breeding stock must be considered as a short-term revenue center. Second, at present breeding stock prices, meat production is unprofitable. Meat production must become a viable profit center over the long run. Unfortunately, it has been estimated that 200,000 head of elk would need to be available for slaughter in order to allow elk slaughter and processing to become competitive. Virtually everyone agrees that meat production will have to contribute to the revenue stream in a meaningful way in order to allow elk production to become viable in the long run. Third, the death rates assumed in this analysis would be consistent with those found in domestic cattle production. However, if large numbers of elk have to be slaughtered in order to control disease such as happened in Canada, then death losses are radically understated. Fourth, most of the activities budgeted for in this analysis do not include labor costs. Hence, the net return must be considered as a return to labor, management, and investment.

Individual operating and investment costs may differ from those reported in this analysis. The analysis does provide an estimate of anticipated costs and revenues consistent with the assumptions stated. Individual operators should complete a cost and revenue analysis that would be more location-specific.
COMMERCIALIZATION OF WILD GAME RANCHING:
ENTERPRISE BUDGETS

Elk Ranching

Wild game (elk) ranching is an agricultural-related business that is relatively immature in North America, though it is slightly more mature in Canada. Up to this point, the primary market for elk ranching has been breeding livestock, antler velvet, and meat, in order of economic importance, with meat constituting the least profitable alternative. There are a number of issues that could affect the economics of elk ranching which are not directly addressed in this brief analysis including (1) genetic contamination, (2) disease transmission, (3) increased likelihood of poaching, and (4) reduced access to private land hunters. The major issue addressed in this analysis is the benefit-cost balance of commercial (private) elk ranching in Utah.

Market for Elk and Elk Products

Breeding Stock

Commercial game production has occurred in a number of countries across the world, with New Zealand and China being the largest producers. The major North American suppliers of "elk" products are producers in Alberta and Saskatchewan, Canada. The leading production area in the U.S. is Colorado, but other states (including Missouri) have limited experience. Significant commercial production began in Canada in 1983 and the number of farms producing wild game has increased eight-fold since 1985. At one time, it was anticipated that the industry would mature in a 10-15 year interval. After more than 10 years, the market for breeding stock has remained strong and has provided the primary market outlet for Canada's elk producers.¹

During recent years, approximately 75-80% of revenue from wapiti (elk) farms has been generated from live (breeding) sales, with the balance produced from sale of velvet (Stelfox, Hoofed Mammals of Alberta, Lone Pine Publishing, Edmonton, Alberta, Canada, 1993). Returns from meat sales have been almost non-existent. Excluding the former Soviet Union countries, five countries comprise the major free-world production of breeding stock and velvet, New Zealand, Australia, Canada, U.S., and Mexico. (Scandinavian countries have been long-term centers of "wild game" ranching but the type of game generally produced there is not the type which produces the highest quality velvet [and, hence, animals for breeding and the animal meat is used more extensively there than elsewhere in the world.])

¹One reason for the longer-lived strength of breeding animal prices may be that approximately ½ of the elk on Alberta game farms have been destroyed since 1990 in an intensive effort to eradicate bovine tuberculosis (Alberta Chapter, The Wildlife Society, 1993). Had such a program not been implemented, prices for breeding animals would likely be much lower today than found at present.
In 1992, sales of yearling females in Alberta averaged from $7,000 to $10,500 per head, $7,000-$17,000 for pregnant adult females, $9,000-$12,000 for open adult females, $2,000-$3,500 for male calves, $2,500-$3,000 for male yearlings, $5,000-$8,000 for breeding quality mature bulls, and $3,000-$4,000 for average mature bulls (Stelfox, 1993).

Today’s prices from one “elk ranch” in Colorado range from $1,500 for a bull calf to $10,000 for a high-quality breeding bull. Heifer calf prices are approximately $4,000, while breeding cow prices are approximately $6,500 (Bar KS Elk Ranch, Strasburg, Colorado, www.wapit.net/co.bkse.htm, 1996).

A large auction company specializing in elk breeding stock (Moore’s Auctioneering Ltd., Alberta, Canada, www.mooreauctionresults.html) recorded the following (approximate) average prices from 1989 through 1996 (excluding 1991 when no sales occurred):

<table>
<thead>
<tr>
<th>Year</th>
<th>Heifer Calves ($)</th>
<th>Yearling Bred Heifers ($)</th>
<th>Open Cows ($)</th>
<th>Bull Yearling Calves ($)</th>
<th>Yearling Bulls ($)</th>
<th>Mature Bulls ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1989</td>
<td>4,600</td>
<td>6,445</td>
<td>8,300</td>
<td>6,500</td>
<td>2,400</td>
<td>2,800</td>
</tr>
<tr>
<td>1990</td>
<td>7,400</td>
<td>9,400</td>
<td>11,500</td>
<td>8,000</td>
<td>2,800</td>
<td>4,200</td>
</tr>
<tr>
<td>1992</td>
<td>4,500</td>
<td>8,000</td>
<td>8,000</td>
<td>7,000</td>
<td>1,200</td>
<td>2,200</td>
</tr>
<tr>
<td>1993</td>
<td>4,500</td>
<td>5,000</td>
<td>6,000</td>
<td>-0-</td>
<td>1,500</td>
<td>2,500</td>
</tr>
<tr>
<td>1994</td>
<td>4,200</td>
<td>6,200</td>
<td>7,000</td>
<td>3,300</td>
<td>1,400</td>
<td>2,700</td>
</tr>
<tr>
<td>1995</td>
<td>7,000</td>
<td>9,500</td>
<td>12,000</td>
<td>4,500</td>
<td>2,000</td>
<td>4,000</td>
</tr>
<tr>
<td>1996</td>
<td>5,000</td>
<td>6,500</td>
<td>7,500</td>
<td>9,000</td>
<td>4,000</td>
<td>4,000</td>
</tr>
</tbody>
</table>

Reported 1996 sales by The Elk and Bison Company (www.wapiti.net/aucreslt.html) included:

<table>
<thead>
<tr>
<th>Year</th>
<th>Heifer Calves ($)</th>
<th>Yearling Bred Heifers ($)</th>
<th>Open Cows ($)</th>
<th>Bull Calves ($)</th>
<th>Yearling Bulls ($)</th>
<th>Mature Bulls ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>-0-</td>
<td>3,600</td>
<td>-0-</td>
<td>-0-</td>
<td>2,500</td>
<td>-0-</td>
</tr>
</tbody>
</table>

It is clear that there is a wide range of prices for these breeding animals. Given the variation that exists, the prices used in this analysis are:

Heifer Yearling Bred Open Cull Mature Yearling Bull Cull Calves Heifers Cows Cows Bulls Bulls Calves Bulls ($) ($) ($) ($) ($) ($) ($) ($) 4,000 4,500 6,500 4,500 1,000 4,500 3,000 1,500 1,500

Renecker (Renecker and Hudson, eds., Wildlife Production: Conservation and Sustainable Development, AFES Misc. Publ 91-6, University of Alaska at Fairbanks, Fairbanks, Alaska, 1991) suggests that there will be a shortfall in supply for approximately 10 more years in
Canada. Whether a shortage in breeding animals will extend that period of time in the U.S. depends on whether or not the industry expands here, but that depends to a significant extent on whether disease problems can be controlled (see footnote #1).

**Velvet**

Demand for velvet comes primarily from Asian countries, with the largest growth market being China. Other domestic markets are also projected, though there has been little development in these markets to date.

China and New Zealand are the largest velvet producers, with New Zealand the largest exporting country. Velvet is typically harvested annually from bulls. The highest prices are obtained for velvet that is harvested prior to calcification, with velvet from elk receiving the highest return, followed by red deer, sika deer, and reindeer.

The velvet season for elk runs through May and June and antlers can be harvested only after the buttons drop (the antler stubs from the previous year are shed). Mature elk are generally ready to harvest at 65-75 days after the buttons drop. Antlers are typically harvested beginning when bulls are two years old. The harvested antlers are frozen under special conditions, then sold in a frozen state. Mature bull may produce from 20-40 pounds of velvet each year, but the average production in 22-24 pounds. (Note: Stelfox [1993] reports commercial velvet production at approximately 8 kg (17.6 pounds) per bull.) The Elk Breeder’s Home page (www.wapiti.net/velvet.htm) reports top end production at 40 pounds per adult bull, though this is inconsistent with other production reports (i.e., 3.3 pounds per year of age up to 10-12 years [Renecker and Renecker, North American elk, Summer, pp. 49-54, 1996]). After 10-12 years of age, velvet production stabilizes or (more likely) declines due to reduced feeding efficiency due to worn teeth (Renecker and Renecker, 1996). With a constant movement of velvet bulls into and out of the herd, it should be possible to maintain velvet production at 24 pounds per mature bull.

Over the past 15 years, velvet prices have ranged from $35 to $115 per pound, with recent prices averaging between $55 and $60 per pound. The price used in this analysis is $55/pound.

**Venison**

While New Zealand is the largest exporter of farm-raised venison, several former Soviet Union countries combine to provide the largest exporter of venison. Canada does not have any commercial slaughter facilities for elk but farm gate prices for slaughter animals was approximately $1.93/pound of live weight in 1991 (Renecker, 1991). The animals typically have a dressing percentage of between 55% and 60% (Renecker, 1991; Renecker and Renecker, 1996). While there is an active market for breeding animals and velvet, a significant market for venison from North America has not yet been developed. Venison that is sold is generally sold as a specialty product in certain types of restaurants: upscale, hotel, theme, and country clubs (Glary and Randel, Marketing Exotic Game Meat Products to Restaurants, Texas A&M Extension
Service, Texas A&M Agriculture Research and Extension Center, Overton, Texas, 1995). It has been estimated that there would have to be at least 200,000 head of elk for slaughter before sufficient economies of scale would be achieved for a price that would expand meat sales (Bishop, Alternative Livestock Production, Processing, and Marketing for Western Colorado, Colorado State University Cooperative Extension, San Miguel and West Montrose Counties, Norwood, Colorado, 1991). Furthermore, at current prices, sales for meat are insufficient to provide a positive net return given existing breeding prices. It is highly likely that small increases in supply of venison would have a significant detrimental impact on venison prices.

Yearling bulls (up to 18 months) will generally have a dressed carcass weight of 400 to 440 pounds and will sell for approximately $4/pound. Yearling heifers will have a dressed carcass weight of 290 to 310 pounds and will sell for approximately the same price. Older meat is less desirable. Not only does it take on a darker (redder) color, but it becomes less tender with age. Some processes are available which can tenderize the meat but alternative products (jerky, sausages, etc.) may be the most likely outlet for older animals. Other possible products for which no definitive market was identified include sales of the head and cape to taxidermists.

**Hunt Bulls**

One possible final product from elk ranching would be “hunt bulls.” Mature bulls will often have large antler racks and can be sold to “hunting” ranches or preserves. Any area purchasing such an animal must also be fenced to avoid disease or genetic problems. It is not clear what conditions or regulations would have to be implemented in order to avoid problems with genetic contamination, disease, etc. Hence, no bulls were sold as hunt bulls in this analysis.

**Benefit/Cost Analysis**

This section summarizes the various tables which accompany the analysis of “elk ranching” or “elk farming” for Utah. It is recognized that there are a number of alternative scenarios that might be used in analyzing such an enterprise. Other assumptions regarding numbers and/or prices or costs can be utilized so two scenarios are included in this analysis. The first assumes the purchase of new equipment, while the second assumes the purchase of used equipment. This analysis follows that done by Renecker (personal communication, 1996).

**Table 1—Elk Farming Investment Costs**

This table summarizes the major investment costs associated with an elk enterprise. A 10% interest rate is assumed in amortizing the fixed expenses into an annual payment. A useful life of 10 years is assumed unless otherwise noted.

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2These weights are significantly higher than for elk in the wild. It is not clear that these weights are consistent with actual production experiences though Renecker has followed elk through the entire slaughter process and reports such weights.
Land. As a general rule, 3 cow elk can be supported on the same amount of pasture that 1 beef cow would require. A newly established legume/grass pasture should provide sufficient feed for 7 months of grazing for 1 elk cow (Shandfruk, *The Horn*, Summer 1996, pp. 6-7). Renecker suggests that the number of acres required by elk would range from 1-3 acres per adult animal. Using the lower limit suggests that 80 acres would be required for 40 cows and 40 velvet and breeding bulls. This also provides space for the handling facilities. Assuming a purchase cost of $600/acre for irrigated pasture, the amortized per acre land cost would be approximately $98. Land costs vary by location within Utah. Highly productive irrigated pasture is assumed in this analysis but it is recognized that highly productive land in some areas, i.e., Cache County, would cost nearly double the level cited here. The total land acquisition cost would be $48,000 in total or $7,812 annually (assuming a 10 year debt retirement). Obviously, land which was more productive (or equally as productive but cost less) would reduce the elk investment significantly.

Pasture Improvement. It is estimated that it would cost $67/acre to establish the pasture to meet production needs for elk under both scenarios. This would imply an annualized cost of $11/acre for a total of $880 for the 80 acres actually in pasture.

Fence. Fence costs were estimated to be $15,800 per mile of fence under both scenarios or slightly under $3 per linear foot. A fence height of at least 8 feet is required to keep the ranch elk in and other animals out of the pasture(s). A wire netting (woven wire) fence should be used with smaller openings at the bottom and larger openings toward the top. This cost includes the hardware (posts, fence materials, and construction machinery rental) and labor. For 80 acres, it is estimated that 1.2 miles of fence would be needed, for a total cost of $18,960 and an annualized cost of $2,109.

In order to extend the pasture life, it is recommended that a rotational pasture system be developed. For this analysis, it was assumed that four pastures of approximately 20 acres each were developed under Scenario I and fenced with the first pasture requiring .5 miles of fence, the next pasture fence requiring .4 miles, the third pasture fence would be for .2 miles, with the final pasture requiring .1 miles of fencing. This fencing cost also allows for additional “within” pasture fencing to separate the various animals, i.e., breeding cows from mature velvet bulls.

Handling Facility. The facilities required to handle elk generally include a fenced corridor or alley (with gradual curves) that joins the paddocks to the handling area, a covered building (elk are more relaxed under subdued light conditions), and a weigh scale. The estimated costs for these facilities under Scenario I was $15,000 in total, for an annualized cost of $1,953. Under Scenario II, a cost of $12,000 was assumed for an annualized cost of $1,465.

Hydraulic Squeeze. A hydraulic squeeze chute (could also use a pneumatically controlled squeeze) is needed to facilitate velvet removal and animal handling for various medical procedures. It is estimated that a hydraulic squeeze under Scenario I would cost approximately $7,500, for an annualized cost of $976. Under Scenario II, the purchase cost was assumed to be $5,500, for an annualized cost of $651.
**Watering Equipment.** Elk require an adequate supply of high quality water. Since the operation is set up as a rotational pasture, it is necessary to have water facilities in each of the pastures, plus at the central handling facility. It is estimated that the lines and water equipment will cost approximately $4,000 in total under either scenario. This would imply an annualized cost of $570.

**Truck.** A truck is needed to transport elk (via a trailer) and for the hauling of other materials. A 3/4 ton truck is assumed to cost $25,000 under Scenario I, with a useful life of 5 years. This represents an annualized cost of $4,485. Under Scenario II, a used truck was assumed at a cost of $13,000 for an annualized cost of $1,319.

**Stock Trailer.** A stock trailer is also required to move elk and other materials. Under Scenario I, the trailer was assumed to cost $8,000, with an annualized cost of $976. A cost of $5,000 was assumed under Scenario II for an annualized payment of $488.

**Tractor and Loader.** A tractor and loader is needed to move bedding, feed, and other materials, as well as to clean up various areas. (Note that no other farming equipment is budgeted for in this analysis which suggests that the “pasture” farming would have to be contracted for and is costed for on that basis.) The tractor/loader cost under Scenario I was estimated to be $15,000, for an annualized cost of $1,953. Under Scenario II, an initial cost of $11,000 was assumed, with an annualized cost of $1,302.

**Freezer.** Freezers are required to freeze antler velvet. Antler velvet is sold frozen and stringent requirements accompany the processing and sale of this product. It is estimated that three freezers would be required to hold the velvet from the 40 velvet producing elk included in this analysis under both scenarios. The cost per freezer is assumed to be $800, for a total cost of $2,400. The annualized cost of the freezers is $342.

**Breeding Stock.** While the prices to be used in the analysis were discussed earlier, there has been some controversy regarding the optimum breeding life of mature elk. Several authors suggest that elk can breed effectively for 15 to 20 years (Bar KS Elk Ranch, 1996; Renecker, 1991). However, mature bull elk production of velvet peaks when they reach the age of 10-12 years. Given the constant replenishment of the base herd due to active calving, it is not anticipated that any animals would need to be kept longer than 10 years. However, if animals were kept longer, their annualize cost (given the prices cited earlier) could be reduced.

If purchased, and assuming a 10-year productive life (pay-off period), annualized animal costs are as follows:
<table>
<thead>
<tr>
<th>Category</th>
<th>Annualize Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bred Heifer Yearlings</td>
<td>$570</td>
</tr>
<tr>
<td>Bred Cows</td>
<td>$895</td>
</tr>
<tr>
<td>Open Cows</td>
<td>$570</td>
</tr>
<tr>
<td>Mature Breeding Bulls</td>
<td>$570</td>
</tr>
<tr>
<td>Mature Velvet Bulls</td>
<td>$407</td>
</tr>
</tbody>
</table>

**Taxes.** Property taxes are assumed to be $5/acre per year under either scenario.

**Table 2—Elk Farming Operating Costs**

Operating costs are assumed to be those noted below with their accompanying annual value:

- **Feed**—A total feed cost of approximately $165/head for the mature cows, $186/head for the mature bulls, and $112/head for the yearling animals.\(^3\)
- **Utilities**—$10/head
- **Fuel, oil, and gas**—$10/head
- **Insurance**—$0.75/$100 of value for a total of approximately $35/head
- **Marketing**—$20/head
- **Licenses/Fees**—$5/head
- **Pasture Maintenance**—$107 per acre for 40 acres for $4,280 in total
- **Miscellaneous**—$10/head
- **Machine/Equipment Maintenance**—4% of purchase cost per year
- **Fence/Handling Facility Maintenance**—4% of purchase cost per year
- **Interest Cost**—An interest rate of 8% was assessed against annualize investment costs and operating costs with 6 months interest charged against operating costs.
- **Death Loss**—3% of existing animal (cows, bulls, and calves) per year

*Note that these costs are generally consistent with those reported by Jerry and Kathy Perkins of Delta, Colorado [1994 and 1993 actual per animals costs]. The primary exception is the interest cost that are shown in that analysis.*

**Table 3—Elk Farm Investment Schedule**

The investment time line is given below. Table 3 provides a summary of the investment schedule assumed in this analysis as enumerated below.

---

\(^3\)Hay—.75 tons for bred cows; .9 tons for bulls; .47 tons for bred heifers @ $75/ton
Oats (Barley)—.30 tons for bred cows; .38 tons for bulls; .19 tons for bred heifers @ $128/ton
Supplement—.2 tons for bred cows and mature bulls and .15 tons for bred heifers @ $350/ton. These calculations assume 5 months of feeding rather than the 6 months required in Canada.
1. The decision to develop an elk enterprise is made in year 1. The initial capital investment under Scenario I is $1386,500. The initial handling facilities are also built in year 1, as are and fences around 1/4 of the 80 acres is developed in year 1 (requiring .5 miles of fence) and the second half of the pasture is fenced, with the additional 60 acres developed in year 4, but not fenced until years 5, 6, and 7. The interest rate used is 10% and the investment is expected to repay over a 10-year period. The initial capital investment under Scenario II is $115,305.

### Project Time Line

<table>
<thead>
<tr>
<th>Investment</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Purchase Land</td>
<td>1</td>
</tr>
<tr>
<td>Pasture Improvements</td>
<td>½</td>
</tr>
<tr>
<td>Fence</td>
<td>¼</td>
</tr>
<tr>
<td>Handling Facilities</td>
<td>1</td>
</tr>
<tr>
<td>Hydraulic Squeeze</td>
<td>1</td>
</tr>
<tr>
<td>Water System</td>
<td>1</td>
</tr>
<tr>
<td>Truck</td>
<td>1</td>
</tr>
<tr>
<td>Stock Trailer</td>
<td></td>
</tr>
<tr>
<td>Tractor with Loader</td>
<td></td>
</tr>
<tr>
<td>Freezer</td>
<td></td>
</tr>
<tr>
<td>Bred Yearling Heifers</td>
<td></td>
</tr>
<tr>
<td>Breeding Bull</td>
<td></td>
</tr>
</tbody>
</table>

2. Twelve bred heifers is purchased in year 1, with a breeding bull purchased in year 1 under both scenarios. The entire calf crop will be retained in expanding herd size, 44 breeding cows and 40 bulls (2 for breeding and velvet and 38 for velvet production). The heifers will produce their calves at 2 years of age. A 3% death rate is assumed.

3. Under Scenario I, the equipment purchased is assumed new. Costs could be reduced if used equipment were used, but it becomes more difficult to ascertain useful life on used equipment and the operational and maintenance costs also increase as reflected in Scenario II.
4. 80 acres of irrigated pasture is purchased under Scenario I. There is some discrepancy with respect to the number of acres of irrigated pasture that would be required to feed 80 head of elk for 6-7 months during the year. Renecker (1991) suggests that 2 acres per animal is required, Shandruk (1996) suggests that an acre can carry 1 mature elk. Following Shandruk's conclusion for both scenarios, the necessary pasture acreage is assumed to be 80 acres. Under both scenarios, only ½ of the land requirement is purchased in year 1, with the balance purchased in year 4.

5. A cow-to-bull ratio of 25:1 is maintained under both scenarios.

6. A calving rate of 90% is assumed for mature cows, with an 85% calving rate assumed for heifers under both scenarios. A 95% weaning rate (of the 90% and 80% calving rates) is assumed for both mature cows and heifers.

7. Under both scenarios, elk are fed hay and grain 5 months during the year but are given supplement year-round.

8. The handling and watering facilities are constructed and pickup purchased in year 1. Large chest freezers are purchased in years 2, 5, and 7. A stock trailer is purchased in year 3, and a stock trailer is purchased in year 3 and hydraulic squeeze, scale, tractor and loader are purchased in year 4. The difference between Scenario I and Scenario II is the cost of the various items.

9. The market value of the stock remains constant through 10 years for both scenarios over the period of analysis. This must be considered optimistic given the anticipated decline in breeding market as the industry matures.

10. Breeding bulls are purchased as needed with the first bull purchased in year 1 and the second bull purchased in year 5.

11. Unlike Renecker's analysis, I have not assumed that bulls will be sold for slaughter for several reasons. First, there is simply no way to process elk at the present time except on an individual basis. Second, the animals are prime velvet producers until they are 10-12 years of age, but once they reach that age, they do not provide the highest quality meat. Third, the returns for elk sold for slaughter is substantially less than for other uses (velvet and breeding). Still, I agree with Renecker that there will need to be a market for meat as the industry matures simply because there will be limited uses for breeding bulls and something must be done with the animals once their velvet production declines. A salvage value of $1,000 per head is included in the analysis which should come fairly close to reflecting what the elk would be worth for meat at current prices. Current cow costs could not be recovered strictly through the sale of meat and velvet—breeding stock provides the necessary revenue to cover costs!
Following the assumptions made in the investment portion of this analysis, the operating costs are summarized in Table 4 for years 1-10. No investment costs (annualized or other) are included in the operating expenditure table. The primary difference between Scenario I and Scenario II is the lower cost of pasture, equipment, and facility maintenance incurred for Scenario II.

Table 5—Combined Investment, Operating, and Interest Costs

Investment and operating costs are summarized in Table 5 for years 1-10, along with the projected interest costs for both scenarios. Interest is assessed at 8% per year for investment items and operating items, but the interest on operating funds is charged for only \( \frac{1}{2} \) the year. The interest for any year is based on that year’s investment and operating cost, plus previous investment and operating costs, less any returns realized during the year that are assumed to be used for debt retirement. The primary difference between Scenario I and Scenario II is the difference between investment costs.

Table 6—Annual Revenue Projections, Years 1-10

It is assumed that all of the calves are retained until the herd size is increased to 44 breeding cows and 40 bulls, two for breeding and velvet and 38 for velvet alone. Revenues peak and stabilize in the 7th year at over $170,000. There is no difference in the revenue flow between the two scenarios. Note that these revenue figures do not consider the sale of meat as it is the lowest revenue provider. These revenue figures apply only over the time when breeding stock can be sold at or near current prices.

Table 7—Cash Flow Projections, Years 1-10

When total revenues are added to total costs (investments, operating, and interest), cash flows are positive after 9 years under Scenario I and after 8 years under Scenario II. This is somewhat different than Renecker’s analysis which concludes that net cash flows turn positive in year 7 or 8. Once again, the difference between the two scenarios is primarily the difference in investment costs.

Table 8—Annualized Costs and Returns

These tables summarize the annualized costs associated with production in year 7. Under Scenario I, there is a net loss contrary to the conclusion reached by Renecker and Perkins. The categories generally match those of the Perkins’ operation in Colorado except that the interest cost is substantially higher in this analysis than in theirs. Under Scenario II, with a smaller land base and used equipment, a net return of $585 is realized. This is over $1,000 less than shown by Perkins. The primary difference is the added interest cost accounted for in this analysis.
This particular table should not be used to justify movement into elk ranching, however, because the values in this table essentially ignore previous interest costs that must be accounted for in a correct, long-run analysis!

Table 9—Summary of Animal Numbers and Animal Values

These tables summarize the value of the animals held and sold for any given year. The values are the same under both scenarios. The value of the inventory grows to nearly $450,000 per year by the 8th year based on the values shown in Table 10.

Table 10—Animal Values

The values used in this analysis for each of the “product” options (i.e., heifer calves, yearling bred heifers, etc.) are given here. Both scenarios utilized the same product prices in calculating the value of inventory and/or sales.

Table 11—Retention and Sale of Breeding and Velvet Elk

In order to determine the number of each animal available for sale during any time period, a table was constructed showing the animals available within each category, both for breeding or velvet purposes and sale. These values are the same under both scenarios considered in this analysis. If it were decided that not all animals would be kept until the breeding herd reached the desired level (i.e., that a slower expansion than indicated in this study), sales revenues could be enhanced, which would reduce the accumulated interest cost.

Summary

Interest has recently been shown in “elk” ranching as a possible high value agricultural commodity. Elk ranching has an extensive history elsewhere in Canada and New Zealand, but it is only of recent origin within the U.S. Colorado has the largest number of such ranches in the U.S., though significant numbers of animals are produced elsewhere in the U.S. as well.

Given the target of 84 animals (44 breeding females, 2 breeding bulls, and 38 mature velvet bulls), the economic picture is mixed depending on (1) the size of the operation, (2) productivity of the operation, (3) cost of initial inventory (primarily with respect to land and machinery and equipment), and (4) the cost of interest. Elk ranching was shown to be profitable under both of two scenarios, one in which new equipment and a larger land base was required and the other with used equipment and a smaller land base, over the 10-year horizon examined. The interest for any year is based on that year’s investment and operating cost, plus previous investment and operating costs, less any returns realized during the year which are assumed to be used for debt.

There is a direct trade-off between size and productivity, particularly with respect to pasture requirements.
retirement. The primary difference between Scenario I and Scenario II is the difference between investment costs.

There may be unique situations where land and other resources are suitable for commercial elk production, but each of the costs included in these analyses should be accounted for very carefully before elk production is attempted. Furthermore, it should be noted that it would be impossible to pay for the relatively high cost of breeding animals once the breeding market dissipates. This implies that the value of breeding stock would have to be significantly reduced. Whether that will take 5, 10, or 15 years is difficult to say, but the time will come when less valuable products will have to be sold to continue elk production.
Scenario I Results
Scenario II Results