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Economic Aspects of Livestock - Big Game Relationships as Viewed by a Livestock Producer[1]

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The two words *"Range Management"* in the title of this American Society stand for a great deal and are of national importance because some 160 million people depend in part upon the livestock products that come from the ranges of this country. It is the responsibility of *good range management* to supply enough livestock to meet the demands of a growing population. In view of this responsibility, "The Economic Relationships of Livestock and Big Game" that we are discussing here today is of importance to every one of us, especially to those of us in the livestock industry.

Big game and livestock are particularly competitive for palatable forage and water in the mountainous areas in Arizona. Sportsmen and State Game Department technicians frequently say that competition between big game and livestock does not exist on *good range*. It is equally true that competition does not exist between one cow and another when a range is good because of proper stocking. But proper stocking has been achieved by reducing livestock numbers. At the same time game populations have been allowed to spiral upwards.

The enormous increase in big game populations during the last 20 years has deprived livestock of their fair share of forage and browse. Range resources could be divided fairly between livestock and big game if such a division were made proportional to the investments and economic contributions made by the livestock industry and if such a division were made to meet the needs of an increasing population. Let us consider some of the investments and economic contributions that are made by the livestock industry.

Investments in Land Improvements

Arizona differs from the states further north in having very limited supplies of water. There are very few live creeks and rivers. Natural, permanent water available to livestock and big game is trivial compared to developed water. Due to the small amount of natural water, game increased very little before livestock men started their water development program.

To give an example of how livestock men have invested in water developments and other land improvements, I have selected an area in Northern Arizona consisting of approximately 193,000 acres and ranging in elevation from 6,000 to 7,000 feet. I feel the area is a typically controversial livestock-game range because big game graze every acre. This particular area is 76 percent National Forest, 19 percent private land and 5 percent State land. Please keep these percentages in mind as we see how, and by whom, the water developments were made on the lands. Stockmen constructed the following water developments with their own money during the past 20 years: (1) 93 earthen dams, (2) 8 deep wells varying from 450 to 1,050 feet in depth, (3) 29 miles of ditches to collect water and fill the earthen dams, (4) 16 metal or concrete drinking tubs, and (5) several miles of pipeline. The water developments cost the stockmen of this area $116,000 or the equivalent of 60 cents per acre for the 20-year period. This does not include any maintenance or repair costs.

Now, let us see what the Forest Service, State Land Department, State Game and Fish Department and sportsmen have contributed towards these water developments. The Forest Service, with its limited congressional appropriations, has contributed mainly technical advice and approval. However, on ranges outside this area, the Forest Service has furnished funds for a program of water development.

The State Land Department, the State Game and Fish Commission and sportsmen have made no contributions toward developing water in this area. The State Game Department has made a number of water developments outside this particular area, but in all cases, they were constructed solely for the use of game.

Besides the costs of developing water, there are many other capital expenditures that are required on a stock range of this type. Over 200 miles of fence at a cost of $500 per mile adds another $100,000 or another 50 cents per acre just for proper distribution and even utili-

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zation. Federal agencies cooperated in the construction of a substantial amount of these fences.

Juniper is presently being cabled on the area at about one dollar per acre. The cost of eradicating juniper is being shared by the Forest Service. On other areas, ranges are being reseeded in cooperation with federal agencies.

While these range practices have been aimed at improving livestock production, they have also increased the production of game. Many reseeded areas that are protected against livestock for the purpose of getting a successful establishment of plants are used by deer, elk and antelope from the time the plants sprout. Many such areas have had to be reseeded a second time before a good stand could be established. We may also expect juniper eradication to benefit big game as our present control methods generally do not remove the better browse species. Incidentally, I might comment at this point on the benefits to deer from shrub control in California as was recently reported (Biswell *et al.*, 1952). It was found that the deer populations on chamiza brushlands opened up by control methods ranged from 40 to 110 deer per square mile; but only 10 to 30 deer were found in the dense untreated brush. The reported ratio of fawns to deer was 115 to 140 per 100 does in the treated area but only 60 to 80 fawns per 100 does in the dense untreated brush.

By continuing these range improvement practices supported by a supplemental feeding program, the stockmen have but one goal in mind, namely, better utilization and proper distribution for higher production. Let us take a look at what we have gained or lost in return for our heavy investments in land improvements.

Greatest Benefits to Game

Our selected area has had greater increases in game than is indicated by the state averages, because this area is located in Coconino County, a county that supports over half the big game in Arizona.

First, let us look at the population trends of big game in Arizona in recent years. I believe the first elk hunting in Arizona began in 1935 with 266 permits issued and 145 elk killed. In 1947 there were 1,616 permits issued and 501 elk taken. This was the year that the State Game Department, the Forest Service, and the stockmen agreed to hold elk numbers at the 1947 level. In spite of this agreement, 6,019 hunters killed 1,557 elk in 1953, *more than three* times the number taken in 1947 and *more than 10* times the number taken in 1935. This increase has occurred even though the Game Department has attempted to maintain the 1947 elk numbers by increasing the number of hunting permits.

My records on deer go back only eight years. But these figures are astounding for even such a short period. In 1946 there were 30,827 deer hunters afield, and they took 6,328 deer for a hunter success of 20.5 percent. In 1950 there were 39,353 hunters afield who took 11,284 deer for a hunter success of 28.7 percent. In 1953, 53,635 hunters took 18,803 deer for *an unbelievable* hunter success of 35.1 percent. In other words, there were *three times as many deer taken* in 1953 than were taken in 1946 with an increase in hunter success of 14.6 percent.

For antelope, the State Game Department's surveys indicate an increase of about 340 percent for the years 1942 through 1953. A very limited number of hunting permits have been issued annually in order to increase the numbers of antelope.

Now, let us see what has happened to livestock numbers in the selected area. Stockmen were allowed to graze 5,194 head of cattle on this area in 1937 under Forest permits. Voluntarily, the stockmen have continued to take reductions, until today the permitted number on the Forest is only 2,391 head, a *decrease of 2,803 head or 53 percent.*

I cannot say that the terrific increase in big game is the sole reason for the great reductions in livestock numbers. There have been other factors, such as the encroachment of juniper, pinyon and ponderosa pine into former grasslands. Other land-use pressures have increased too, such as logging operations, highways, mining, etc. The Forest Service has been reseeding about half of the most severely disturbed logging areas with some good results.

Stockmen in this general area firmly believe that the tremendous increase in big game is a major factor in forcing the great reductions in livestock numbers. They resent allowing big game to increase and replace the livestock taken off the ranges. Isn't this resentment justified in view of the fact that stockmen have invested heavily in range improvements with little or no help from sportsmen? This source of annoyance and complaint is further intensified by the public discredit and abuse livestock men have so frequently received from sportsmen and their writers. Mutual cooperation would be greatly encouraged if sportsmen were to give credit and favorable recognition to stockmen for making land improvements that benefit game.

Is it economically sound to permit *increases* in big game to replace reductions in livestock? As stockmen, we say no. Though we are admittedly biased towards operating on a sound business basis, we are trying also to supply a growing population with adequate livestock products.

Since forage and browse resources are very limited shouldn't they be utilized as efficiently as possible? I do not mean that we should totally remove either big game or livestock. But we should set forth a policy in view of economic needs that would determine how many game or livestock should be permitted to graze our native ranges.

Efficiency of Production

Unquestionably, efficiency of production should be carefully considered in determining a fair basis

for dividing forage resources between domestic stock and big game. Efficiency of production is usually thought of in terms of getting the highest possible net returns in the long run over the costs of production. The success of a livestock operation is somewhat doubtful when the margin between net profit and costs of production is small. This is particularly true where profit depends upon fluctuating market prices and unpredictable year-to-year changes in weather. Effects of these fluctuating conditions on livestock producers have been quite obvious these past two years.

The margin of profit must include a comfortable degree of insurance against market changes and years of drought. Actually, this gives the livestock industry the incentive to continually search for ways and means of increasing the efficiency of production and the efficiency of utilizing range resources. This, of course, becomes impossible when the carrying capacity or permitted livestock numbers on a given range are reduced to a point at which the operation ceases to be an "economic unit."

Let us try to compare the production of big game and livestock from an efficiency standpoint. This is a subject for research experts but we can at least take a look at the surface of the problem.

Because most sportsmen earn their livelihood from many professions, such as medicine, law, education, industrial occupations, etc., they are not too concerned with the efficiency of producing game and utilizing limited forage and browse resources. They are not too concerned about costs of producing game so long as they can buy licenses and hunting equipment.

By contrast, a livestock grower's costs of production are very real and the amount of his income will depend on how efficiently he can produce livestock.

In comparing costs of production, let us first consider *"labor and employment."* Labor is an important cost of producing livestock, no matter how small the ranching unit. There is the labor of the owner himself in addition to the costs of hiring ranch hands, men for range improvements, building contractors, bookkeepers, legal advisers, etc. There is the cost of employing the tremendous working force for feeding cattle; the labor force used in processing, transporting and marketing livestock and the many by-products such as leather, fats, fertilizers, etc. The livestock industry and the distribution of its products to consumers offer tremendous sources of employment.

By comparison, the important costs of labor for producing game involve the salaries paid administrators and regulatory officers, whose chief duties are to see that game laws are enforced. The number of people employed in the control and handling of big game herds is very limited. Game provides little employment in such activities as processing and transportation. Marketing of wild game is largely illegal except for the game produced by registered game farms.

Hunting, of course, usually involves a high cost to most sportsmen. But this is the cost of *harvesting* game and includes costly equipment, distances traveled and losses in income or wages when hunters are not on paid vacations.

Costs of Land Rentals and Grazing Fees

Livestock men pay rentals to use state and private lands, and grazing fees to use federal lands. By comparison, no rentals or fees are paid for the use which game makes of federal, state or (the use of) most private lands. Hunters pay fees for licenses, and in some areas they pay fees for the privilege of hunting on private ranges. But, do such fees compare to the land rentals and grazing fees paid by livestock men? A large part of the fees paid by hunters indirectly goes to paying for administrative, policing, and regulatory activities, while only a very small part goes back into the land for improvments that can be used by both livestock and game.

Reductions in grazing fees paid into the federal treasury result when livestock numbers are reduced in favor of game.

Tax Costs

Ranchers and sportsmen alike pay income taxes and property taxes. The main difference in taxation is that livestock operators pay taxes on a per head basis for domestic animals, in addition to property taxes on private lands and income taxes. We can't help being proud of the fact that we are about the only industry of agriculture that hasn't asked for a federal subsidy during these critical times and, therefore, we haven't been a burden to the taxpayers.

Hunters, on the other hand, do not pay taxes on a per head basis for big game animals.

Reductions in tax revenues result when livestock numbers are reduced in favor of game.

Cost of Vandalism

Ranchers using ranges that support game herds are faced with the costs of damages resulting from vandalism by some hunters, such as livestock killed; residences and line camps damaged; windmills, water tanks and troughs shot full of holes; fences torn down and gates left open, permitting cattle and horses to stray and become lost; destruction from fires caused by carelessness; and many other acts which cause permanent damage, lost time and money. Sportsmen's organizations have made sincere attempts to curb vandalism but the damage continues.

Efficiencies by Herd Control

Animal numbers must be controlled to make the most efficient use of forage and browse. Ranchers try to keep numbers of stock in balance with the available forage and browse on all areas of the range. This means reducing num-

bers in periods of drought, marketing the natural increase yearly, (including females) and using methods for distributing animals evenly over the range. Ranchers aim at high production by controlled breeding, a good example being one high quality bull to 15 or 20 cows. Herd controls reduce mortality losses and give high percentage calf crops.

By contrast, the control of big game herds, being dependent on hunting pressures, is largely inaccurate and haphazard. No real concerted effort is made to reduce game numbers during prolonged periods of drought, or to harvest the natural increase yearly. The male to female ratio is normally stabilized at 1:2, 1:3, or 1:4. Such ratios are considerably less efficient than the male to female ratios for domestic stock. Controls over fawn and elk calf crops are largely left to natural factors. Mortality losses among game animals are very high, particularly among old females. Losses inflicted by predators, motorists, diseases, starvation and wasteful killing are high.

Every game animal that is lost or that remains on the range as a mature non-producer represents a waste of forage and browse.

Efficiencies of Processing

Commercial processing of livestock products into meat, hides and numerous by-products is organized on a highly efficient basis. It is often said that everything but the "squeal" of an animal is used, and now I understand that even the "squeal" is being tape-recorded for sound effects in radio programs.

By contrast, the harvesting and handling of game by hunters is generally very wasteful. The wasteful means of harvesting game are described by that well-known sportsman-conservationist, the late Aldo Leopold (1949):

> "It is now a demonstrable fact that Wisconsin deer hunters, in pursuit of a legal buck, kill and abandon in the woods at least one doe, fawn or spike buck for every two legal bucks taken out. In other words, approximately half the hunters shoot any deer they see until they find a legal deer and kill him. The illegally killed animals are left where they fall. Such deer hunting is not only without social value, it constitutes actual training for ethical depravity elsewhere."

I do not know what this wasteful killing amounts to in Arizona, but I do know it exists from the carcasses I have found while riding the range after the hunting seasons are over. Besides wasteful killing, there is the tremendous loss of game meat by spoilage, because of improper care and refrigeration. Few hides of game animals are used. Some trophy heads are mounted.

Wasteful killing and wasteful handling of game meat waste forage and browse.

Efficiencies of Utilization

Animals differ in their efficiencies for utilizing forage and browse. The daily amounts of food eaten by animals involve energy relationships and are not directly related to size. That is, larger animals generally make more efficient use of similar feeds than do smaller animals. Efficiencies of utilization for several different animals are indicated by the experimental results of several authorities. (Morrison, 1938; Nichol, 1938; Vorhies and Taylor, 1940, and Arnold, 1942) Reported results show that a 1,000 lb. cow requires 18 lbs. of dry legume hay daily; 1,000 lbs. of live weight sheep require 20 lbs. of similar feed per daily ration; 1,000 pounds of live weight deer require 23.5 lbs.; 1,000 pounds of live-weight laboratory rats require 60 lbs. and 1,000 pounds of live weight jack rabbits require about 70 lbs. Domestic livestock thus appear to be most efficient in the use of similar feeds. Efficiencies of utilization such as these will have to be carefully considered in the future if forage and browse resources are to be used most efficiently.

Summary

A fair division of forage and browse between domestic livestock and big game, must take into account the following economic aspects:

1. Ranchers make heavy investments in water development, fencing, reseeding, shrub control, etc. to improve private, state and federal range lands while sportmen groups make little or no comparable investments.
2. Big game share the benefits from land improvements made by ranchers while most water developments constructed by State Game Departments are for the exclusive use of big game.
3. The management and production of livestock are more efficient than the management and production of big game.
4. A large labor force is employed in the production, feeding, processing, transporting and marketing of livestock products and by-products. Game do not provide comparable sources of employment although the employment by manufacture of guns, ammunition and hunting equipment should not be overlooked.
5. Livestock producers pay rentals and grazing fees for the use of ranges not privately owned. Big game, on the other hand, use state, federal and private ranges without charge. Livestock producers pay taxes on a per head basis for livestock while no comparable taxes are paid on big game.
6. Efficient livestock production requires such herd controls as: seasonal and yearly balancing of numbers with available forage, harvesting natural increases including some females and all old animals, controlled breeding, maintaining proper male and female ratios and reducing mortality losses. By contrast, the con-

trol over big game numbers is inefficient and haphazard.

7. Livestock utilize forage and browse more efficiently per unit of live weight than do big game.
8. A fair division of forage and browse between livestock and big game must take into account future demands for livestock products by an increasing population.

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