

## QUALITATIVE NUTRITION — A GAME MANAGEMENT TOOL

MELVIN O. STEEN, Chief, Fish and Game Division, Missouri Conservation Commission

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Environment is the key to the welfare and the abundance of every species of life that lives on this earth of ours.

Anyone who has an ecological concept will accept that statement, and will further agree that food is a vital part of environment. Adequate nutrition is an environmental "must" in the minds of the layman and the wildlife technician alike.

Up to that point their thinking is correct, but beyond it tends to go astray.

It is common belief that the requirements of adequate nutrition are met when the animal gets enough to eat. In other words we have a quantitative concept. We assume that qualitative needs are met when quantitative requirements are satisfied.

I submit that adequate nourishment is primarily a qualitative thing, hence the average concept of nutrition is erroneous. It is my conclusion that most animal life on this earth would be better nourished if it had more quality and less quantity in its food supply. I submit further that this is particularly true of most of the area represented at this conference.

Is it not true that one hind quarter from a good Northern (*borealis*) whitetail buck will outweigh its entire counterpart among the diminutive Key deer? Do we not have here one species of animal, divided into many sub-species, geographical races which are closely correlated with soil fertilities and hence qualitative nutrition? "Aha!", the scientist will say, "that is circumstantial evidence; you have no real proof." Granted, but up in Missouri we have found some supporting evidence that we think worthy of consideration.

In the course of our efforts to restore deer in Missouri, we have trapped and transplanted a great many animals during the last ten years. A major source of supply throughout the program has been a herd of whitetails living in our southern Ozarks, on soils of low fertility. In fact, they are considered the least fertile of a rather wide range of soils in our state.

It will be helpful to understand that the Missouri deer herd was at a low ebb a decade ago, and that there were no deer in most of the state at that time. Since the author is a firm believer in mass plantings in any attempt to populate a range, it has been our practice to stock a minimum of fifty deer in each release area.

In keeping with this policy, a mass planting of deer was transferred from the Ozark area referred to above, to a new range of substantially higher fertility. The release area had no known deer in or near it. We had an isolated and unoccupied range, and a mass release, hence the chances of infusion from any source were virtually nil.

Approximately five years after the stocking, the release area was opened to deer hunting. Although we expected some differences, we have been astonished to

see the variation revealed by the records of our weight stations in these two localities. Deer taken on this release area have averaged 28% more than the deer taken in the Ozark area; in other words the progeny is nearly a third heavier than their own immediate ancestors.

Here is a case where there can be no significant genetic variation. It is true that the quality and quantity of deer food in the new range is greater than the old, but there is no evidence of quantitative deficiency in the latter. As far as we can determine the deer have enough to eat in both localities, hence we conclude that higher quality plant life adds up to higher quality animal life in this case, just as it has in many well-authenticated tests throughout the nation.

We find considerable differential, too, in the rate of growth and the attainment of sexual maturity in the two locations. This differential is general throughout the state; deer on our more fertile lands grow faster, attain sexual maturity earlier, and hence have a higher rate of reproduction. We conclude that qualitative nutrition enhances reproduction as well as the size of these deer. Please note here, that I refer here to qualitative nutrition, not the quantitative food supply. Every deer manager knows that an overbrowsed range, (i.e., quantitative deficiency) slows reproduction, but how many of you know that full rumens do not insure maximum yield from your deer herds?

We have found similar evidence in the case of other Missouri wildlife. In the analysis of more than 8,000 raccoon we found that the average weight of this species was fully 20% greater on our best soils than on those of lowest fertility. Moreover, five times as many raccoon were taken per ten square miles on our better soils, in spite of the fact that our poorer soils are not as intensively cultivated hence have better cover conditions.

In Missouri the cottontail rabbit is our most important game animal, so we naturally took a good look at "Mister Bunny." We checked the weights of more than 175,000 live-trapped rabbits. We found a weight advantage of one-third (33.3%) in rabbits coming from our most fertile soils. The weight variation by soil types was so striking that we decided to go into the matter further.

Accordingly, we collected 450 rabbits on our major soils types for critical tests and investigations. Included were accurate measurement of the femur bone, and a breaking test of this bone. To make a long story short the rabbits coming from our most fertile soils had a femur bone 12% larger and twice as strong as did the cottontails trapped on our least fertile soils.

I have often speculated that waterfowl migrate primarily because they seek higher quality food during that part of the year wherein they produce and rear their young. In any event they are migratory, hence we have not attempted to apply qualitative nutrition tests to waterfowl as we do with our non-migratory species. However, we have used the qualitative concept in our management of waterfowl, with excellent results.

We design and develop full control over water levels on all the waterfowl projects that we build. We do this by means of a storage reservoir, or other permanent water supply, with which we irrigate shallow pools or marshes located downstream. The project is so constructed that these marshes can be drained or flooded at will.

We use an operational technique wherein we drain the marshes, fertilize the ground, seed wild millet and smartweed, and re-flood to those depths and at those times that our experience and investigations indicate to be desirable. We find that

we can produce up to fifty times as much waterfowl food per acre with this technique as is possible in a permanent pool. Moreover, we think the food so produced has qualitative superiority and hence is more attractive to waterfowl.

As our principal source of goose browse we use cultivated uplands which are fertilized according to soil test, and sown to winter grains, primarily winter wheat. We find corn and soybeans useful also, but the mainstay of our goose food supply is winter wheat, heavily fertilized.

We find that these areas have a number of advantages over the conventional waterfowl refuge. First of all, the storage reservoir doubles as a fishing lake. Secondly, when an adequate sanctuary or rest area is provided (either on the project or nearby) the unit attracts and holds waterfowl indefinitely. They tarry with us just long as our permits and our food supply lasts. Finally, high quality food available in the migratory and winter range of waterfowl is essential, we believe, to the vigor and fecundity of the breeding birds we send North each Spring.

We have, of course, other waterfowl areas, some of which are man-made impoundments and some of which are natural lakes and streams. Many of them are not very attractive to waterfowl, and offer little or no possibility of improvement, hence do not meet our needs. I am convinced that, more and more in the years ahead, we must all concentrate and feed as many waterfowl as possible on specialized and intensively managed areas, although it is evident that there will be a wide range of need for this as between the states. On such areas, the maximum production of high quality food is a must. I suggest that you give this consideration in the planning of waterfowl management in your states. I know that some of you feel that this is primarily a device to gain a larger share of a reduced supply of waterfowl, and I grant that those states having the most attractive areas will draw and hold the most waterfowl. I submit, however, that qualitative nutrition is a tool that can increase the continental production of waterfowl, and therefore a management must for all who would improve waterfowling, or even retain the gunning we now have.

This paper would not serve its purpose if I did not indicate the manner in which qualitative nutrition can be put to work as a game management tool in this region, and the potentiality of such application. To do so, however, I think it necessary to review some facts concerning the southeastern United States.

The area is, generally, one of high rainfall, long, warm summers, and short, mild winters. In other words your annual precipitation is high, and so are your mean temperatures. That adds up to soil-destruction rather than soil building. The end result is low soil fertility, and hence qualitative deficiency in the plant life of the region. This directly affects nutrition, because an animal can never be better than the plant it eats.

There are many interesting examples of this in both the wild and the domestic animals of the region. I have already mentioned the whitetailed deer; a more striking example, perhaps is the domestic cow.

Leon Hornkohl, of the U. S. Forest Service in our state, has given me some interesting figures, gleaned from the records of 6 experimental stations, Forest Service data, and other sources. The figures apply to cattle grazing on open, unfertilized range in various sections of the United States, where they had plenty of native forage or hay to eat but no grain or supplement at any time. Hornkohl set out to learn the weight of the average cow at maturity, the calf crop produced (percentage-wise) and the weight of the calves at eight months.

In areas having approximately 20 inches of precipitation, including snow, the mature cow averaged about 1,000 pounds, the calf crop averaged about 90%, and the calf averaged 425 pounds at eight months.

In areas having around 60 inches of rainfall the mature cow averaged about 650 pounds, the calf crop averaged 30%, and the calf averaged 225 pounds at eight months.

In between there were gradations which varied with rainfall and mean temperatures. In general, the cattle had more to eat in the high-rainfall regions, but the cows grazing in low-rainfall areas found more quality in their food supply. There are greater quantities of nutrient minerals available to the plant growing in a low-rainfall area, hence plant quality is high although quantity is low.

There are four things necessary to the production of high quality and high quantity plant life, and hence high quality and high quantity animal life — plenty of sunlight, air, water and plant food. You have all of these things in abundance. Your major problem is that you have your plant food in the wrong places.

Within this region are great quantities of limestone, rock phosphate, potash and other sources of nutrient minerals. Nitrogen may be a bit of a problem until greater production has been attained, but even so, what other region has a T.V.A. producing nitrogen right in its own back yard?

You have long growing seasons and copious rainfall, and you are sitting right on top of ample plant food supplies. You have all the elements of production at hand, and you are also close to our major markets. What more could any region ask? You have clear-cut climatic and economic advantages, but to cash in on them you must get that plant food out of your mines and out on the land.

In Missouri we have doubled and trebled the wildlife populations of low-fertility Ozark range by heavy fertilization and proper tillage of no more than one to two percent of that range. You can do as much and more on your low-fertility lands, and you can also improve wildlife populations on your better lands. But best of all, by your influence and demonstration, you can help bring an agricultural and economic revolution to the Southeast that will make you all a happier, healthier, more prosperous people. I believe this firmly, for it is my conviction that the Southeast has greater potentiality than any other region in this nation — it is our last and our best frontier. I suggest and urge that you make the most of it.