

QUAIL NEWS

No. 5

October 1999

The newsletter of game bird research and management from the Bollenbach Chair, Oklahoma State University.

QUAIL CAPACITY

Aldo Leopold coined the phrase, **carrying capacity**, to describe a property of game range. Carrying capacity is nowadays thought of as the number of healthy animals a unit of game range can support without damage to habitat.

Leopold defined **saturation density** as a property of populations. When wild animals reach saturation density, Leopold said, they are limited by themselves, not by the carrying capacity of the range. He speculated that bobwhites reach saturation density at about 1 bird/acre.

Subsequent to Leopold's pioneering work, a substantial amount of research has clarified the management relevance of carrying capacity for quail populations.

One way to view carrying capacity is to compare the energy (calorie) requirements of a population with the

energy available to the population.

Management practices such as discing strips to promote forbs, planting food plots and setting out feeders all are designed to increase carrying capacity by increasing energy supplies.

Science has a remarkable body of knowledge on the energy needs of bobwhites. Individual birds require **at least 23 kcals/day**. A kcal (kilocalorie) in animal nutrition is the same as a calorie in human nutrition. This small

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amount of energy is the minimum cost for living.

When the temperature declines, bobwhites must generate heat, which they do by burning calories. A bobwhite in an environment at 0°F uses about 50 kcal/day.

Walking, running, and flying add but slightly to energy needs in comparison with that used to keep the body temperature at about 106.7-107.6°F.

Scientists have also measured the amount of energy available in the foods that bobwhites eat.

A tally of energy needs and energy available gives the number of quail an area can support.

On typical rangeland in Oklahoma, the energy available in foods would support bobwhite populations averaging 1.8/acre at the start of hunting season; this excellent density exceeds the saturation density of 1/acre estimated by Leopold.

Adding a productive, 2.5-acre food plot for every 120 acres would increase the carrying capacity of natural Oklahoma range by 7%.

If Leopold is correct about saturation density, adding food plots would have no effect on bobwhite abundance. The

QUAIL NEWS is published twice yearly by the Department of Forestry, Division of Agriculture and Natural Resources, Oklahoma State University, Stillwater, OK 74078. Subscribe with a contribution to "OSU FOUNDATION/GAME BIRD RESEARCH FUND." Direct inquiries to Fred S. Guthery at the above address (phone 405/744-9431, e-mail forfsg@okstate.edu). The Bollenbach Chair is part of the Oklahoma Agricultural Experiment Station.

native range already provides more than enough food energy for saturation density.

For further information, contact Fred S. Guthery at Department of Forestry, 008C Ag Hall, Oklahoma State University, Stillwater, OK 74078. Ask for a reprint of *Energy-based Carrying Capacity for Quails*.

THE QUALITY-QUANTITY CONUNDRUM

Modern quail managers are in a dither over whether to manage for habitat quality or habitat quantity.

The right holds that bobwhite density increases with habitat quality, as measured by the amount of foods, the interspersions of required cover types, and the diversity of plants and animals on an area.

The left says quail don't see the same world as quail managers. This side says if quail have space to live in, they are not sensitive to changes in foods, interspersions, and diversity.

Recent research by J. Scott Taylor and associates, University of Wisconsin, produced ambiguous results concerning the quality-quantity conundrum. Based on studies in Kansas, bobwhite populations showed behaviors that fit the quality outlook and other behaviors that fit the quantity outlook.

In the history of management research, bobwhite populations have tended to increase on areas when more habitat for them to live in was added to the area.

Editorial: Outfoxin' Aflatoxin

Aflatoxin is a chemical by-product of the fungus, *Aspergillus flavus*. The toxin is hazardous to domestic and wild animals.

Aflatoxin was discovered in about 1960 as the agent responsible for the death of some 100,000 turkey poults in the British Isles.

Aspergillus is a mold of feedstuffs. Feeds such as peanuts and corn are particularly vulnerable to contamination. Because corn is a popular supplement for wild quail, there has been a good deal of concern in recent years about aflatoxin poisoning of wild birds.

The best way to beat aflatoxin is simply to get rid of the feeders. Although feeders may influence the distribution of coveys, research results generally show that they don't affect the number of coveys. Supplemental feeding is, on average, a neutral management practice--it neither helps nor harms quail populations in most situations.

Why lose sleep over an ineffective management practice?



Fred S. Guthery
Bollenbach Chair in Wildlife Ecology

These birds have tended to remain at the same population levels when biologists tried to improve the quality of the areas they occupied.

For further information, contact J. Scott Taylor, Wildlife Research Section, Nebraska Game and Parks Commission, 220 North 33rd Street, Lincoln, NE 68503. Ask for a reprint of *Macrohabitat Effects on Summer Survival, Movements, and Clutch Success of Northern Bobwhite in Kansas*.

**Copy Quail News to kith
and kin.**

PHEEDING PHAILS PHEASANTS

"On present evidence, spring feeding cannot be advocated as a management technique to improve the breeding success of pheasants surviving the winter," report A. N. Hoodless and associates in the *Journal of Applied Ecology* (1999).

The research took place in southern England. Wheat was supplied in hoppers along woodland edges and hedgerows.

Supplemental feeding had no effect on the survival and nesting behavior of hens, or on the production of chicks. Roosters congregated around feeders. Bottom line: results indicate supplementation is ineffective.

Q Could you please furnish
U information on California
A quail, San Diego County,
I California. The population on
L our lease has declined from 6
coveys with 100 or more quail in
1994 to 3 coveys of 40 each in
1998. We have noticed more
Q snakes of all types. No skunks,
U opossums. Not many crows or
E hawks. Do packrats eat quail
S eggs? A few more California
T ground squirrels. It does seem
I warmer in the fall. Strong, hot
O dry winds. Could this be
N driving coveys to higher
S elevations? Forty percent
young birds in 1998.—
**Thomas Tunstall, Huntington
Beach, CA.**

The diet of packrats, also known as woodrats, consists primarily of vegetation. Val W. Lehman wrote the following about woodrats in South Texas (*Bobwhites in the Rio Grande Plain of Texas*, 1984):

“Woodrats ..., afforded with multiple opportunities to eat quail eggs, took none. Dummy nests (168), purposely constructed 5 to 15 yards from active woodrat dens, were not molested. In captivity woodrats ... refused to eat quail eggs.”

Ground squirrels can be important nest predators.

Quail populations are sensitive to the weather. In fact, if they have a reasonable amount of space to live in, numerical fluctuations are tied primarily to variation in the weather. Production is depressed by drought and by high temperatures in late summer. Hot

summers can reduce production even if rainfall is normal or above. Your finding of 40% young in 1998 indicates poor production.

If you experienced a 3-year run of poor production because of the weather, you would observe declining numbers. Weather seems to be the most likely explanation; it is something you should check.

This year we purchased pen-raised birds to be released in small groups for dog work. My neighbors ... tell us pen-raised birds have a negative effect on the wild bird population. If you could comment on this it would be very much appreciated.—Byron F. Dyer, Houston, TX.

There are at least 3 concerns over the release of pen-reared stock into wild populations of quail. The first is disease. If the pen-reared birds have some disease, they could infect wild birds.

The second concern has to do with genetics. It is possible in theory that, if pen-reared birds survived and bred with wild stock, the crossing could be associated with loss of genetic diversity, or the pen-reared birds could carry a gene that is damaging in context. A potential loss of genetic diversity is purely speculative. In fact, there is a chance domestic-wild crosses could increase genetic diversity.

In general, scientists know that higher genetic diversity leads to better survival and production in wild animals. However, these scientists have virtually no idea what level of genetic diversity is required. Some wild species, like polar bears, have remarkably low levels of

genetic diversity. Yet the polar bear persists in the wild.

An introduced gene that is bad in context could harm populations over the short term. For example, the breeding season of wild quails varies with latitude. If an introduced gene caused hens to lay at the wrong time of year for the environment, reproductive failure likely would ensue. Such defects would be eliminated rapidly from the gene pool.

The third concern has to do with ecological processes. If you release pen-reared birds with wild stock, there is bound to be competition for food and space. Whether such competition is good, bad, or indifferent is purely a matter of personal values.

Research by Theodore DeVos, Jr., and Dan W. Speake, Auburn University, indicates that the introduction of pen-reared stock does not reduce the survival rate of wild stock. So, in this study, the introduction of pen-reared birds seemed neutral to wild birds.

Is there a bottom line? You certainly would want to purchase birds from a reputable dealer who practiced good hygiene (disease and parasite control) in his rearing facilities. Concerns over genetics seem overblown because (1) the vast majority of released birds will die before they have a chance to breed with wild birds; (2) if a released bird survives and reproduces its genetic code is, by definition, acceptable, and (3) natural selection will quickly and mercilessly extirpate birds with maladaptive genotypes.

"We had a good season in 1998-99, with less than optimum numbers of birds, but plenty of coveys to keep it interesting. We took very few, only shooting off covey rises, and only if the dog work was perfect.

"We've cleared several hundred acres (out of 3,000 total) and are getting ready to plant. The cleared swathes are 100-150 feet wide. We're considering planting sorghum alnum, common sunflower, and Alamo switchgrass.

"I've just re-read Quail News No. 3 about predator control, and we're not going to do any. Our nesting and escape cover are good, and will stay that way. I have one question in this area, though. I've enclosed photos of the brush piles left after clearing. They'll provide cover for quail, but it's probably not needed. We're wondering if they'll become better places for predators to den in than for quail to escape to."--Robert W. Carter, Millersview, TX

Sorghum alnum probably will give you the best return. Common sunflowers provide a good feed source. Alamo switchgrass is primarily a cover plant; bobwhites eat the seeds, but the seeds are too small to be meaningful nutritionally.

I don't think it will make any difference to your quail population whether you burn the brush piles or leave them standing. Judging from the habitat around the brush piles, I see your quail will have ample opportunity to avoid predators.

This is our quail harvest by age, sex and month ... during the 1998-99 season. I am sending it to you out of curiosity. Are there any observations or recommendations you might wish to make based on these numbers?—Bill Read, DeRidder, LA

The overall age ratio of 1.22 juveniles/adult is low, but not as low as in many parts of Texas last year. If forced to guess, I would say you had better production than most people did because of light grazing. This likely fostered survival of nests and chicks and lengthened the laying season.

The percentage of females in the harvest was 48% for adults, 42% for juveniles, and 45% overall. Bobwhite populations typically have more males than females and these results are normal.

Based on the harvest records, your population consisted of 55% juveniles. Normal for the region is somewhere around 80% juveniles or perhaps a little less. Thus, you will enter the 1999 production season with a relatively "old" population, which is good. Experienced birds tend to be better producers than young birds. On the other hand, because of low production last year, you may not enter the breeding season with as many birds as normal.

If you maintain these harvest data over the long-term, you can derive additional information about the quail population. The average percentage of juveniles in the population is a rough estimate of the average annual mortality rate. Likewise, the average percentage of adults estimates the average annual survival rate.

Note to the media: feel free to use the information in *Quail News*. Please acknowledge the Office of the Bollenbach Chair and the Oklahoma Agricultural Experiment Station.

SLACK IN HABITAT

Quail habitat has a property called **slack**. Because of slack, many different arrangements of brush patches and openings are equally valuable to quail.

Bobwhites range from Costa Rica to Wisconsin, and from Virginia to eastern Colorado. They have been introduced in Oregon, Washington, Hawaii, and Italy. With such a broad range, it is clear that the birds are fit to live in a variety of habitat settings.

A recent computer modeling experiment revealed that, within a large range of conditions, managers can increase or remove woody cover with no effects on bobwhite populations.

This experiment and other results show that Aldo Leopold's Principle of Edge is often a bogus concept for quail managers. Leopold's principle states quail abundance increases as habitat edge increases. In fact, increasing or decreasing edge may have **no effect** on quail abundance. The Principle of Edge contains a grain of truth that holds under limited circumstances.

The key for management is to provide usable space through time. Variable amounts of edge seem to have no effect

Coming soon....

On Bobwhites

by

Fred S. Guthery

published by

Texas A&M University Press,
College Station, TX

Sections include *Life and Times, Management, Populations and Harvest, and Issues and Philosophies*. The book will appear in late 1999 or early 2000.

on quail abundance if space is usable all the time.

Creating usable space is a matter of arranging woody coverts so that coveys are never far from brush. The **J. Grant Huggins 50:50 Rule** is a good model to follow:

"A bobwhite should never be more than 50 yards from a clump of brush 50 feet in diameter."

For further information, contact Fred S. Guthery at Department of Forestry, 008C Ag Hall, Oklahoma State University, Stillwater, OK 74078. Ask for a reprint of *Slack in the Configuration of Habitat Patches for Northern Bobwhites*.

QUAIL SYMPOSIUM

Dr. Leonard Brennan, director of research at the Tall Timbers Research Station in Tallahassee, Florida, will discuss the status of bobwhites in the United States at Dale Rollins' North Texas Quail Symposium. The symposium will be held in Abilene, Texas, during 13-15 October 1999.

Brennan reported in 1991 that bobwhites would go extinct in the United States by 2005 if the then-current population trends held into the future.

Speakers at the symposium will address a variety of topics on the biology and management of quail populations and habitat. Speakers include Nova Silvy, president of The Wildlife Society; Rocky Evans, Quail Unlimited; Markus Peterson, Texas A&M University; Steve DeMaso, Oklahoma Department of Wildlife Conservation; and Fred S. Guthery, Oklahoma State University.

For further information, contact Dale Rollins (d-rollins@tamu.edu, 915/653-4576) or visit <http://texnat.tamu.edu>.

Support game bird research:
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