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# RED-LEGGED PARTRIDGES OF SPAIN

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## THE FOREIGN GAME INTRODUCTION PROGRAM

Year by year the number of individuals seeking relaxation through hunting is increasing. Yet the area available for this sport is slowly decreasing. Likewise, much of the habitat which mothers the game crop is becoming less and less able to produce shootable surpluses under the impact of clean farming, over-grazing, drainage, power equipment, increased use of insecticides and herbicides, scientific forestry, urbanization, and declining soil fertility.

Faced with this situation, common sense dictates an all-out effort to increase habitat productivity. But there are many habitats which have been so thoroughly changed by man that native game species can no longer maintain themselves therein in numbers sufficient to provide good hunting. Competing interests and the cost of reversing this trend are such that only a part of these lands can be restored to reasonable productivity in the foreseeable future. There are other coverts which never were fully occupied by native game birds or mammals possessing the characteristics requisite to survival in the face of today's intensive hunting pressure. For these, new, adaptable species possessing a high hunting resistance should be sought so that such areas might provide hunting opportunities greater than is now possible. This is the logic behind the foreign game introduction program as developed by the Bureau of Sport Fisheries and Wildlife and its predecessor, the Fish and Wildlife Service, and cooperating State Fish and Game Commissions.

The program is based on requests for assistance from State Commissions following a detailed ecological appraisal of their game-deficient habitats. After analyzing these, biologists are assigned to make a careful study of game species occupying similar habitat and climatic niches in foreign countries. From dozens considered, one or two may then be selected on the basis of their characteristics, habits, reproductive capacity, resistance to predation and disease, relationship to agriculture, ability to withstand heavy hunting pressure, and the possibility of competition with game species native to the United States. Modest, carefully-planned trial introductions of these species, utilizing wild-trapped individuals, carefully quarantined before shipment are then carried out in cooperation with interested State Fish and Game Commissions. Unplanned or "hit and miss" introductions are actively discouraged.

## FOREWORD

Much has been written about the partridges of western Europe. They have been described, measured, and weighed. Their distribution and abundance have been charted with commendable exactness. Tales of partridge hunting are legion. Every good cookbook tells how to make them melt in your mouth. But only in a few technical works can you find reliable information on the life history and ecology of European partridges. Only recently have biologists become curious about what these birds eat, where they live, and what makes their numbers fluctuate from year to year.

To this general trend the red-legged partridges of Spain, England, and France are no exception. In the latter two countries somewhat more is known but, of the two subspecies resident in Spain, where perhaps 3 million birds are shot in a good year, such information as is available would scarcely fill 3 printed pages. Thus one must start virtually from scratch gathering the facts in field and laboratory and winnowing the chaff from the stories told by hunter and trapper, forester, and farmer.

The study of the Spanish red-legged partridge is but one of several, constantly in progress, covering foreign game species that have been suggested for possible trial liberation in the United States. Concurrent with it, work with other partridges and francolins resident in India and the Middle East and with little-known subspecies of pheasants from Afghanistan and Iran has been carried forward. Between 1953 and 1957 only 9 months were spent in Spain, and much time and effort was of necessity concentrated on trapping and quarantining some 1,200 red-legged partridges for trial acclimatization in the United States. Thus the data here presented are fragmentary in many respects and subject to refinement. Particularly is this true of the section on food. No collections of birds in the spring or early summer were made and the facilities needed to identify many of the seeds found in the crops of birds collected at other seasons were unavailable in Spain. Yet there is keen interest in this species in the United States so a compilation of the data currently available should not longer be delayed.

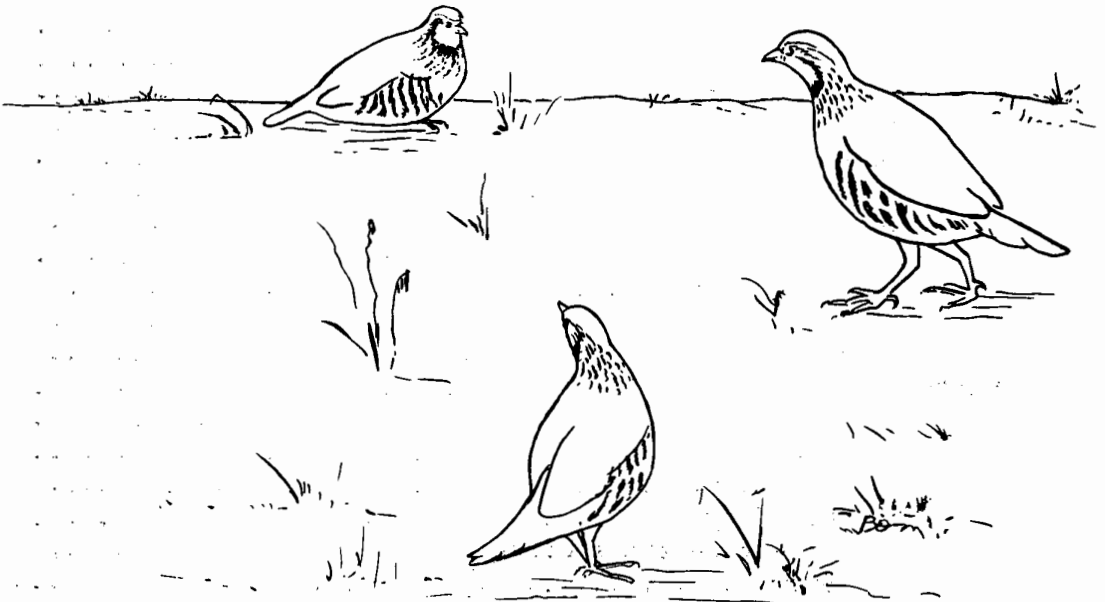
This, the third of these species analyses completed and the first to be issued as a Special Scientific Report, deals with the Spanish red-legged partridge, *Alectoris rufa hispanica*, in northern Spain and *A. r. intercedens* from the South.

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## THE RED-LEGGED PARTRIDGES OF EUROPE

Before considering in some detail the red-legged partridges resident in Spain, let us look for a moment at the species as a whole. The red-legged partridges of western Europe belong to the same genus, Alectoris, as does the well-known chukar partridge. Like the chukars, redlegs are nonmigratory, adaptable, and (in favorable habitat) abundant. In looks the redlegs are superior, for they wear a mantle of finely streaked black and white feathers thrown back like a cape over their backs, shoulders, and upper breasts. They are birds of cultivated or grazed lowlands and of rough, hilly country rather than of the abrupt, rocky slopes so dear to the chukars. Because their range is much smaller and more contiguous than that of the chukars, the red-legged partridges have not become widely differentiated; there is but one species, with five subspecies.

The red-legged partridges are birds of fairly warm and dry habitats. Those subspecies resident in Spain and Portugal occupy the drier and warmer parts of the redleg range; those in England and France the more humid and relatively colder portions. Nowhere are they found where the average temperature for the month of January falls much below 30°F., where the average annual precipitation is much below 10 or above 35 inches, or where snow commonly covers the ground for more than a week or 10 days at a time.

The soil types and pattern of vegetation on and among which they live are varied. They occur commonly on sandy, loamy, or gravelly soils as well as on chalk or clay. They seem to be equally abundant in large, cultivated fields separated by hedgerows or broken up by an occasional small, weedy, or brushy patch and in a matrix of open fields, brushlands, and forest. They are not, however, birds of dense or extensively wooded areas.

A comparison of the redlegs' native habitat with that existing in various parts of the United States indicates that similar conditions are to be found mainly in a belt running from eastern Texas, Oklahoma, and southern Kansas westward through central Texas and northward to the foothills of the Rocky Mountains in Colorado. Some areas in southwestern Utah and in central and southern California also appear to be favorable for this species. Any attempt to acclimatize red-legged partridges east of the Mississippi River or north of Kansas and Colorado is almost certainly doomed to failure.

### Common Names

The red-legged partridges have acquired fewer common names than have many other birds. Most of the names refer to the reddish color of legs and beak. Among them are:

Red-legged partridge	General
French red-legged partridge	England
French partridge	England
Perdix rouge	France
De Koode patrijjs	Holland
Rothuhn	Germany
Pernice	Italy
Perdiz	Spain, Portugal
Perdiz roja	Spain
Redleg	United States
French (or Spanish) redleg	United States

### Taxonomy (1) and Distribution (1,2)

Order	Galliformes
Family	Phasianidae
Genus	<u>Alectoris</u>
Species	<u>Alectoris rufa</u>
Subspecies	Five

<u>Alectoris rufa rufa</u>	France, Northern Italy, England, Balearic Islands
<u>Alectoris rufa hispanica</u>	Northern Spain and Portugal, Madeira
<u>Alectoris rufa intercedens</u>	Southern Spain and Portugal
<u>Alectoris rufa corsa</u>	Corsica
<u>Alectoris rufa australis</u>	Grand Canary Island,

In Europe the red-legged partridges are resident and generally abundant in central and southern France south of the Loire River, and in the Wallis valleys of Switzerland. They are much less abundant, and perhaps introduced, in northern France, Belgium, Holland, and western Germany. Brought into Britain many years ago they have spread widely and become common birds of the Midlands and southern England. In overhunted northern Italy they are occasional to fairly common in the Piedmont, in Liguria, and in the north and central valleys of the Appenines. They are found over most of Spain and Portugal as well as on the Islands of Elba, Montecristo, Corsica, the Azores, and Gran Canaria.



## Introductions

The original range of the red-legged partridges has been considerably extended by successful introductions. Numbers of Alectoris rufa rufa were trapped in France and sent alive to King Charles II of England as early as 1673. This attempt failed, as did many subsequent ones. It was not until 1770 that the species was actually established in Suffolk County utilizing eggs brought over from France. Once naturalized it spread rapidly (2).

The same subspecies was also successfully liberated in the Balearic Islands, and Peters (1) believes that instances of its occurrence in northern France, Holland, Belgium, and western Germany may also be due to introduction.

The redlegs from northern Spain, Alectoris rufa hispanica, have been successfully transplanted into Madeira. Attempts to introduce these partridges from southern Spain into North Africa were probably made by the Moors but without success. There is some evidence to indicate that the birds resident in the Azores and on Gran Canaria Island, although now considered a separate subspecies, were originally brought there from Spain or Portugal.

John C. Phillips (3) in 1928 gave the following excellent summary of the early attempts to introduce the redleg into the New World:

To Lafayette belongs the honor of sending to America the first specimen of a "French partridge", which was received by George Washington at Mount Vernon in November 1786.

W. O. Blaisdell imported a few pairs into Illinois in 1896, but most of these died. He raised some young from the only pair that he had left and turned them out near Macomb. Between 1901 and 1911 only 54 of these birds were imported, according to the records of the Bureau of Biological Survey, so that it is doubtful whether there was any serious attempt to establish them.

It was sometime after the conclusion of the Second World War that the attention of sportsmen returned to these birds. Then Americans who had thrilled to the flight of the redlegs driven over the shooting butts in Spain began to make inquiries of the Fish and Wildlife Service about these partridges. In 1952 George Cranmer of Denver and Madrid made a gift of 119 Spanish redlegs to the Colorado Fish and Game Commission. Twenty-one of the poorer ones were kept on the State game farm for breeding experiments. The rest were liberated in Carizzo Canyon in southeastern Colorado.

The same year my preliminary work indicated this species to be worth careful investigation. Thus began the study of which the present report is one result.

## THE RED-LEGGED PARTRIDGES OF SPAIN

This report is primarily concerned with the red-legged partridges of Spain. Taxonomists have divided these into two subspecies, Alectoris rufa hispanica and Alectoris rufa intercedens, the distribution of which has never been closely defined. It is not the intention in the following pages to consider these subspecies separately except for the known characteristics that might influence the choice of one or another for trial introduction in the United States.

### Distribution and Relative Abundance

In the Iberian Peninsula, the Spanish redlegs are found in every province of Spain and Portugal, though not in Gibraltar. They are particularly abundant in central Spain and occasional to scarce only in the mountainous country of northwestern Spain, in the Basque country, and in the seacoast lowlands of southwestern Portugal.

In favorable habitats, over wide areas, partridges may reach an abundance of 1 per acre at the start of the hunting season. In one ojeo (hunt) near Toledo, in which I participated, over 1,500 birds were put over the butts in 6 drives in 1 day. This is far short of the record.

### Description

Color changes between the different subspecies of red-legged partridges are slight. To facilitate identification, the following is a description of the species, Alectoris rufa, according to Witherby (6), together with the variations characterizing the two subspecies as observed in Spain.

#### Male

Beak and legs coral-red; forepart of crown blue-gray, becoming brown on top of head and nape; a narrow white line over the eye and down the side of the neck; throat edged with black; back, upper wing coverts, and tail coverts olive-brown, often with a suggestion of greenish copper-gold; upper breast chestnut-brown; rest of breast blue-gray washed with brown; upper flanks beautifully barred with black, white, and chestnut; lower flanks and side feathers blue-gray, crossed near the end with a band of pale buff and black and tipped with chestnut. Belly and undertail coverts buff. Tail feathers, 14, cinnamon except for the central pair, which are olive-brown. Longest upper tail coverts nearly as long as central tail feathers. Legs normally with a blunt knob or spur

often not well developed in birds of the year. Instances where one leg is knobbed and the other smooth are usually males, and double knobs on one or both legs have been observed. Length 34 cm. (13½ in.), wing 155-165 mm., tail 88-95 mm.

### Female

Color pattern almost indistinguishable from the male; slightly smaller and usually without or with only a suggestion of knobs on the legs.



Colorado Game and Fish Department

Figure 1 -- Comparison of two red-legged partridges with a chukar partridge.

### Subspecies differentiation

The color patterns of the two subspecies in Spain are often sufficiently distinct to permit fairly easy differentiation.

*Alectoris rufa hispanica*, from northern and western Spain, is considerably darker on its upper and under parts, while more slatish and less olive-brown on rump and upper tail coverts than is its more southern counterpart. The brown patch is also more pronounced and begins further forward on the top of the head.

Alectoris rufa intercedens, from southern and eastern Spain, resembles Alectoris rufa rufa more but is consistently paler than A.r. hispanica. The brown patch also begins at the middle rather than towards the front of the head.

### Weight

The average weight of a Spanish redleg is about one pound. The heaviest male collected weighed 1.2 lbs. (548 grams); the heaviest female just over one pound (462 grams). Birds from southern Spain are usually somewhat smaller than are those from the North. The average for 40 males collected from the South near Ciudad Real was 434 grams; of 42 females, 376 grams. Fifty males from the vicinity of Salamanca in northwestern Spain averaged 458 grams; 50 females averaged 401 grams.

### Habitat

Unlike the chukars, the Spanish redlegs show no preference for steep, rocky slopes and rugged, mountainous terrain. They are more partial to flat or rolling country and to the adjacent, often rather rough hills with valleys between. They occur from sea level to 7,000 feet though are rarely found in numbers far above 6,000 feet even in summer. With or before the advent of snow in early December, they move to lower elevations.

Redlegs are more like Hungarian partridges than chukars in cover preference. Forests with dense undergrowth, thick brushlands, and lush grasslands are generally avoided. Attractive, instead, are extensive, open, cultivated fields or pastures interspersed with grazed woodlands or brushy areas with little to moderately dense ground cover. They are adaptable to a wide range of habitats, however, being common in cultivated fields, on sandy plains and dune country, on rough pastures studded with oak brush, and in open woodlands of evergreen and deciduous oaks, ilex, rock-rose (Cistus sp.), rosemary (Rosmarinus sp.), Spanish broom (Retana sp.), and tiz or whin (Genista sp.). Birds may also be found among woodlands of scattered pine and oak and in the scattered forests and thickets of "saguazo" and lentisco (mastic tree, Lentiscus sp.) which are trees of the often rough and steep hilly country in Spain.

The birds occur on heavy clay as well as light, sandy soils and are more common in dry than in moist areas. Good concentrations may be found on soils high in lime as well as on relatively infertile acid soils if food is available.

Some permanent source of water is a necessary adjunct to good partridge habitat especially during the breeding and brooding season although, at other times of the year, birds are often found at considerable distances (up to 6 miles) therefrom.

On the following pages are pictured typical sections of well-populated redleg habitat in Spain. In each instance one or more coveys of birds were flushed from the area shown in the photograph.

Cover types supporting Spanish red-legged partridges



Figure 2 -- Many birds thrive in surprisingly barren-looking locations so long as some escape cover is available.



Figure 3 -- Cultivated fields are often used for feeding and roosting-- particularly if escape cover is nearby.

Cover types supporting Spanish red-legged partridges



Figure 4 -- Many birds may be found on overgrown areas especially if cultivation is nearby



Figure 5 -- A field of winter wheat among oaks is a favored location in which to find birds.



Cover types supporting Spanish red-legged partridges



Figure 6 -- The vegetation may be scattered with but little shelter beneath.



Figure 7 -- Or thicker with shrubs present to provide escape cover.

Cover types supporting Spanish red-legged partridges



Figure 8 -- Hillsides covered with fairly dense brush offer a favorite retreat for the birds.



Figure 9 -- Valleys or stream courses were often fairly closely grazed. About 70 birds were flushed from this covert before the picture was taken.



## Food and Water

During the course of the investigation 27 crops were collected from birds shot in Spain during fall and winter months. It was possible to get only a few of the seeds contained therein identified in Spain, so samples were planted but only two grasses germinated. Many of the foods taken were subsequently identified as to genus at the Bureau's Patuxent Wildlife Research Station (a).

### Plant foods

Vegetable items, particularly grain, grass shoots, clover leaves, vetches, knotweeds and smartweeds, bulbs and roots constitute the main food of Spanish red-legged partridges. Waste grains - wheat, oats, barley, millet, and corn - and a large variety of vetches (Vicia sp.), particularly algarroba or carob bean, are eagerly consumed by old and young alike. Particularly in dry country, over-ripe grapes mostly fallen from the vine, are acceptable, and green, leafy food is taken in such abundance as to provide a large part of the water requirements of adult partridges for a considerable period of time. A variety of seeds from weeds, shrubs, and trees as well as berries are also eaten.

Table 1 gives a list of the items identified from the crops of 27 Spanish redlegs together with the number of crops in which each item was found.

### Animal foods

Like the chukars, red-legged partridges eat insects, ant eggs and larvae, beetles, spiders, and grasshoppers, but, by volume, these represent a rather minor part of their food except in spring. Small snails are also eaten.

### Food by seasons

So far as could be found no records indicative of the seasonal food preferences of Spanish red-legged partridges have been published. Table 1, mentioned above, lists 32 items found during the current study in redleg crops in fall and winter. To supplement this and to provide a picture of preference during the other seasons of the year Luis Bernaldo de Quiros, a field naturalist and collector for the National Museum of Natural Sciences in Madrid, has considerately listed for us his observations on the food habits of these birds.

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(a) Mostly through the courtesy of Dr. Alexander C. Martin

Table 1 -- Incidence of occurrence of items found in 27 crops of the Spanish red-legged partridges collected in Spain- 1953 to 1955

Scientific name	Common name	Number of occurrences
<u>Green food</u>		
	Grass and green shoots	21
	Small leaves, mostly clover	17
Liliaceae	Bulblets	2
<u>Seeds</u>		
Triticum aestivum	Wheat	11
Vicia sp.	Vetch, algarroba, tare	10
Cynoglossum officinale	Hound's tongue	5
Lolium perenne	Rye grass	5
Polygonum aviculare	Knotweed	3
Setaria italica	Foxtail millet	3
Saponaria vaccaria	Cowherb	3
Vitis sp.	Grape seeds	2
Hordeum vulgare	Barley	2
Amaranthus sp.	Pigweed	2
Agrostemma githago	Corn-cockle	2
Caucalis dactyloides	Wild carrot	2
Avena sativa	Oats	2
Panicum reptans	Panic grass	2
Convolvulus arvensis	Common bindweed	2
Centaurea sp.	Star thistle	2
Onobrychis sp.	Vetch	1
Astragalus sp.	Milk vetch	1
Lithospermum sp.	Gromwell	1
Lotus sp.	Bird-foot trefoil	1
Calendula sp.	Calendula, pot marigold	1
Linum sp.	Wild flax	1
Cirsium sp.	Common thistle	1
<u>Fruits</u>		
Vitis sp.	Grapes	2
<u>Insects</u>		
Formicidae	Ants	1
<u>Miscellaneous</u>		
	Grit	15
	Feathers	1
	Rose thorn	1
	Cow dung	1

Spring -- According to Quiros, insects - ant eggs and larvae, beetles, and in the late spring, grasshoppers - form a considerable part of the redlegs' diet. New buds of algarroba or carol bean (Vicia sp.), poppy leaves and other green food are also eagerly sought after.

Summer -- Quiros indicates that insects become progressively less important, except to the chicks, at this season. Horse beans, tares, carob beans, and the fruit of other vetches appear more commonly in the crop contents. With the harvesting of grain in August, stubble fields are much frequented.

Fall -- Wherever fields are turned over, the partridges may be found in the freshly plowed furrows hunting insects and seeds. On recently planted grain fields they will be found eagerly searching for seeds left on the ground but will not scratch out well-planted grain. Some sprouted seeds, especially wheat and rye, may also be clipped off or pulled up at this season, although not in sufficient quantities to create a nuisance unless the birds are overly abundant. In brushy or wooded areas weed seeds, vetches, blackberries, gooseberries, acorns, the seeds of a large species of "spear-plumed" thistle, and the fruits of the mastic tree are sought after according to Quiros. In the vineyards, over-ripe grapes are much in demand.

Of the 16 birds' crops gathered by the author in November in south-central Spain, 8 were notable for the large volume of a single food that was found therein. Two contained mostly grapes; two, mainly carob beans; one, barley; one, mostly grass seeds; and two, mainly grass leaves with some green shoots of winter wheat.

A. D. Middleton (4) examined 29 crops of French red-legged partridges shot in southern England in September and October and reported the food as follows: grass, clover and other leaves, 16%; sugar beet roots, 28.2%; cereals (barley, wheat, and oats), 27.4%; weed seeds, especially of knotweed and bindweed, 22.6%; and beechnuts, 5.8%. For the sake of comparison, in table 2 are listed the foods found by him and the number of crops in which each item was observed.

Winter -- Quiros reports winter food to be much the same as that consumed in the fall with emphasis on carob bean, seeds of the mastic tree, and waste grain, weed seeds and green food including grain sprouts, clover, and alfalfa.

#### Water

Like many birds of dry countries, the adult Spanish redlegs can survive periods of several months with very little access to open water providing green food is present. Ideally, however, some permanent source of drinking water should be available within a few miles of the normal range of every bird. Broods of young birds are seldom found far from water, even though it be only a seep at the foot of a hill.

Table 2 -- The contents of 29 fall crops from French red-legged partridges (Alectoris rufa) collected in southern England and examined by A. D. Middleton (4).

Scientific name	Common name	Number of occurrences	Percentage by volume
<u>Green food</u>			
	Grass, clover, and leaves	22	16.0
	Flowers and buds	2	0.2
<u>Roots</u>			
	Sugar beet, etc.	6	28.2
<u>Seeds and grain</u>			
<u>Polygonium aviculare</u>	Knotweed	15	16.7
<u>Polygonium Convovulus</u>	Bindweed	12	1.5
<u>Triticum</u>	Wheat	7	9.4
<u>Euphorbia exigua</u>	Spurge	7	1.1
<u>Hordeum sativum</u>	Barley	6	12.8
<u>Brassica arvensis</u>	Charlock, mustard	6	0.5
<u>Viola tricolor</u>	Wild pansy	5	0.3
<u>Fagus sylvaticus</u>	Beech mast	3	5.8
<u>Avena sativa</u>	Oats	3	5.2
<u>Atriplex patula</u>	Orache	1	0.9
Others in small quantities (a)		-	1.6
<u>Animal Food</u>			
	Unidentified	2	0.01

(a) Scarlet pimpernel (Anagallis arvensis); chickweeds (Stellaria media and Cerastium vulgatum); forget-me-not (Mysotis arvensis);ampions (Silene inflata and Lychnis alba); hemp nettle (Galeopsis Ladanum); vipers bugloss (Echium vulgare); hawk's beard (Crepis virens); toad-flax (Linaria Elatine); hawkbits (Leontodon hispidus and L. autumnalis); goosefoot (Chenopodium album); shepherd's purse (Capsella Bursa-pastoris); Wild radish (Raphanus Raphanistrum); brome grass (Bromus arvensis); Italian ryegrass (Lolium italicum); meadow grass (Poa annua).

Adults normally come to water at sunup and, less frequently, before dusk. Relatively little time is spent around the water before fanning out for food on the drier slopes and fields. Youngsters seldom stray far from water for the first month and commonly drink two or three times a day. Dry years and small brood numbers are closely related.

In captivity birds will survive for a week without water or green food. Birds in shipment for 2 days without water evidenced only mild interest in drinking when released. Two quarts of water will fulfill the daily needs of 150 penned birds in winter - more might be required during the heat of the summer. When green food such as alfalfa or lettuce is available, water consumption is reduced to less than a quart a day.

### General Habits

#### Movements and feeding habits

Most bird species exhibit a fairly consistent daily movement pattern. The Spanish redlegs usually gather at night on a knoll in the valley, on a gentle slope, or in an open draw between hills, rather than on steep slopes or rough lands. The immediate situation may vary from an open field to grazed scrublands.

By or before dawn, often when it is too dark to see clearly, the birds normally walk, singly or in small groups, to water. Their thirst quenched, they then spread out in a loose flock in search of food usually working over open fields, weedy areas, or pasture lands. It is not uncommon to come upon groups of 15 to 30 redlegs, early in the morning, leisurely looking for food in cultivated fields, in stubble, or even in recently-plowed furrows. Nor are weedy patches missed if they are not too dense.

By midmorning there is a tendency to work uphill into brushy lands or open forests where clumps of scrub oaks, several species of which are evergreen, scotch broom, ilex, heath, and other shrubs and trees provide respite and shelter from the midday heat. Vineyards are favorite resting places. By four in the afternoon they are usually on their way down to their cover for the night, feeding en route.

#### Mobility

Like most partridges, the redlegs are nonmigratory and normally do not move long distances from their home coverts. In general they are more sedentary than are the chukars. There is, however, a distinct movement from mountain coverts to lower valley lands in late autumn with a gradual return to spring and summer range in March.

They are fast runners and in open situations often prefer to run ahead of the hunter rather than to wait and take their chances in flight.

### Flight

The flight is direct, though the birds may swerve skillfully when being driven over shooting butts. Redlegs are moderately fast fliers, unless scared when, for short distances, they can really travel. Paced with a car, one bird, flying slightly downgrade, but rather leisurely, was clocked at 47 miles an hour.

Most flights are short ones, of 800 to 1500 feet, but driven birds have been known to cover over a mile in a single flight. In hilly country birds may walk to the edge of a narrow valley and span it in one flight, usually alighting near the top of the opposite crest.

Like all of the Alectoris group, redlegs are apt to fly downhill and run up, unless pressed, when they will run or skim for shelter irrespective of topography.

### Wariness

When unmolested these birds are rather tame all year round but quickly become wary when hunted. Any unusual action excites immediate suspicion causing the birds to walk away. In captivity they tame down less readily than do chukars and are therefore not as much used as callers to lure other birds within gun range.

### Resting and roosting

Normally redlegs rest and roost on the ground. They are rather less likely than are chukars to attract notice by calling from the summit of a boulder or the edge of a cliff. Of a somewhat more subdued and practical disposition, they prefer to do most of their calling and resting on a brushy hillside or a rise without unduly exposing themselves, although it is not uncommon for them to perch on the thicker limbs of a stout tree. Several thousand birds held in captivity seldom alighted on narrow roosts as do pigeons and poultry but did not hesitate to roost and rest above the floor on sand tables or on wide, bare boards.

At night these birds prefer to sit in fairly tight coveys of 10 to 40 individuals. Lowland or valley areas are preferred, the crest of a slight rise in such situations often being chosen.

Roosting sites are seldom found in thick grass or dense shrub growth. Selected instead are open, and occasionally plowed, fields and grazed lands often with but a scattering of grass, weeds, or brush. Nor

are open woods or grazed, brushy areas shunned. In summer a high, rather open spot is chosen; in winter low, sheltered places near water are preferred. Unless much disturbed, the birds are apt to return to the same roosting spot night after night.

### Nesting

Nests are usually placed in weedy field borders, in hedgerows, plantations, brushy patches, and waste areas. They are also common in cultivated fields of carob bean, oats, and in other grains. Where birds are numerous the nests are occasionally located within 6 to 10 feet apart. One was found against the wall of a watchman's house. A few have been reported from the crests of haystacks.

The nest is a hollow scratched in the ground, usually among open weeds or clumps of grass or at the edge of bushes or rocks. It is sparingly lined with grass, dried leaves, and weeds.

Nesting dates vary widely in different regions. In southern Spain the first egg may be laid during late March or early April. In the north most nests are not started until late April or May with second nests being found until late June, according to Mr. Quiros.

### Renesting

The birds usually have one brood a year though a second clutch may be laid if the first nest is broken up. There is some evidence, however, that a female may occasionally rear two broods in a single nesting season or may lay two clutches of eggs, one of which may be incubated and the young reared by the male (7).

In France, M. Laurent reports that, in captivity, a male bird sat on the eggs and cared for the resulting youngsters when the female bird was killed on the nest (a).

### Eggs

The normal clutch is 10 to 16 eggs though 20 have been recorded. Rarely two females may lay in the same nest. Eggs are laid at about 36-hour interval according to Mr. Quiros and are seldom covered by leaves or grass while the female is away, often for long intervals.

The incubation period is reported as 23 to 24 days.

The eggs are yellowish white to pale yellowish brown, spotted sparingly with ochraceous red and ashy shell marks; size 41 x 31 mm.; average weight 1.95 grams (5).

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(a) Letter to the author from M. Laurent

### Brooding and rearing

The young leave the nest as soon as the last bird is dry and may be attended by one or both parents. Avoiding dense ground cover, broods are often reared in and along the edges of cultivated fields, especially of carob bean, the leaves and seeds of which are favorite foods. Late in the summer and throughout the autumn several broods may join together to form large coveys moving as a unit.

### Gregariousness

The covey is the normal pattern although groups of two or three birds may be found widely separated from it during the day. When flushed the individuals scatter widely but soon start calling and gathering together again. In size, coveys vary from 15 to 70 or more birds with flocks of 200 to 300 rarely being recorded even during cold weather.

In late winter the males are apt to gather in separate groups of 20 to 40 birds. The picturesque name for these in Spain is "torada de toros" or the herd of the bulls.

### Psychology and behavior

The red-legged partridge is not as nervous or as quarrelsome as the chukar but it is quicker in movement on the ground. Coveys are more inclined to scatter when disturbed and to run rather than to seek safety in flight. Not infrequently they perch on rocks, fences, buildings, and low trees, sometimes even among the foliage.

In captivity there are always dominant, troublesome males, especially at the approach of the breeding season, but instances of severe headpicking, scalping, or killing of one male by another are rare. They get along surprisingly well even when closely penned with other equally tolerant game birds such as Hungarian partridges.

### Calls

Most of the calls are rather similar to those of the chukar. The display note of the male is a remarkable sound which has been rendered as a deliberate, harsh "chucka, chucka" or chuk-er-ra-kar, chik chikar" closely resembling the chukar rallying calls. Or as "wa-shack-shack, wa-shack-shack-" it is suggestive of a laboring steam engine (2).

The female notes may be the same but softer. When a bird takes flight a sharp "kuk-kuk" or "kerk-kerk" is not unusual.

In close captivity the birds, when in good condition, often become inveterate "talkers". Groups, penned together in separate



enclosures or rooms, will set up a conversational clamor that may last for hours and pause only briefly upon the approach of an intruder.

### Interbreeding

No records of this species crossing with other partridges or with quail have been recorded. Crosses between the subspecies of Alectoris rufa are said to occur. Attempts to cross redlegs with bobwhite in captivity in Spain have not been successful. No cross-breeding with Hungarian partridges in Britain, France, or Spain has been reported. Chukars and redlegs penned together during the breeding season on the Price Game Farm of the Utah State Department of Fish and Game did not produce fertile eggs although they might well be expected in close confinement (a).

### Weather and Climatic Analogues

The Alectoris genus is limited in its distribution to regions of moderate to scanty precipitation. To this the redlegs offer no exception though they possibly may thrive in somewhat moister and more humid regions than do the chukars. Conversely they will not tolerate as much cold or snow as will the more widely distributed chukars.

### Precipitation tolerances

Amount -- Redleg range extends from regions with but 10 inches of precipitation a year to those with 30 to 35 inches. Below 12 inches and above 30 inches, however, these birds are seldom abundant in their native range. In Spain the optimum seems to be 12 to 20 inches. The French red-legged partridges in southern England do well in areas close to the upper limits of precipitation which the species will tolerate; the Spanish birds, closer to the lower limits.

Periodicity -- Precipitation over most of the Iberian Peninsula is generally well distributed through the year, except in the summer months. Dry years are common and, when several follow in succession, may cause a marked diminution in partridge abundance through decreased egg production or increased brood mortality. A study of the weather records between 1930 and 1950, however, indicates that partridges have survived a period of five consecutive months, running from early April through August, with no rainfall at all. Months with less than 0.6 of an inch are normal in Spain in summer. Throughout the rest of the year precipitation is usually between 1 and 2 inches a month with the maximum recorded at 3.3 inches, except in the high mountains. But for the occasional thunderstorm, rains are usually moderate with precipitation seldom over an inch at a time. Rainfall during the critical period of May and June varies from 3 inches to 0.3 inch a month, averaging 1.7 inches.

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(a) Letter from Clifton M. Greenhalgh

Humidity -- While the English birds thrive under conditions often humid and foggy, their Spanish counterparts do well where the humidity is relatively low. Dew, however, is substantial in Spain as in many dry climates.

Effect on the species -- Except when the chicks are quite small, moderate rains do not seem to bother the redlegs. Heavy down-pours may somewhat reduce the ability of the adults to fly for a short period thereafter but seldom are the source of serious losses. Wet climates, with their attendant thick vegetation, are shunned by the birds.

Snow -- Unlike the chukars, the red-legged partridges will not endure long periods when the ground is covered by snow. Less of a digger and scratcher, they prefer to move to lower elevations or out into the plains, where, in Spain, the snow seldom exceeds 6 inches or lasts for over a week or 10 days at a time. In fact Spanish birds are most abundant where there is little snow throughout most of the winter. In other areas the wind or the sun on southern exposures usually provide areas of bare ground for feeding.

#### Temperature tolerances

Throughout the range of the red-legged partridges, temperatures seldom go either very low or very high. The species normally is not subjected to as much subzero weather as are many of the chukars or to as much heat as is another relative, the Barbary partridge of North Africa. Redlegs in England and in east-central France have been known to survive at temperatures a few degrees below zero F. and Spanish birds have withstood a maximum of 112°.

Normal range -- The Spanish red-legged partridges thrive in areas where the average temperature in January varies between 36° and 45°F.; for July where it is 67° to 82°. Colder and warmer periods are not infrequent and apparently cause little discomfort to the birds so long as food and water are available.

Average maximums and minimums -- A more informative picture is presented by the average maximum and minimum temperatures which, as in most warm, dry regions, are widely spaced. Table 3 gives some interesting comparisons.

Table 3 -- Range of average maximum and average minimum temperatures in red-legged partridge habitat in Spain by seasons, 1930-50 (a).

Season*	Spain					
	Southern		Central		Northern	
	Av.Max.	Av.Min.	Av.Max.	Av.Min.	Av.Max.	Av.Min.
Winter	54-64	36-44	47-57	29-35	42-51	28-33
Spring	63-79	41-56	56-73	35-50	53-68	35-46
Summer	86-98	60-68	78-93	52-63	73-87	50-57
Fall	62-90	43-64	55-83	35-58	50-77	35-54

\*Winter, December-February; Spring, March-May; Summer, June-August; Fall, September-November.

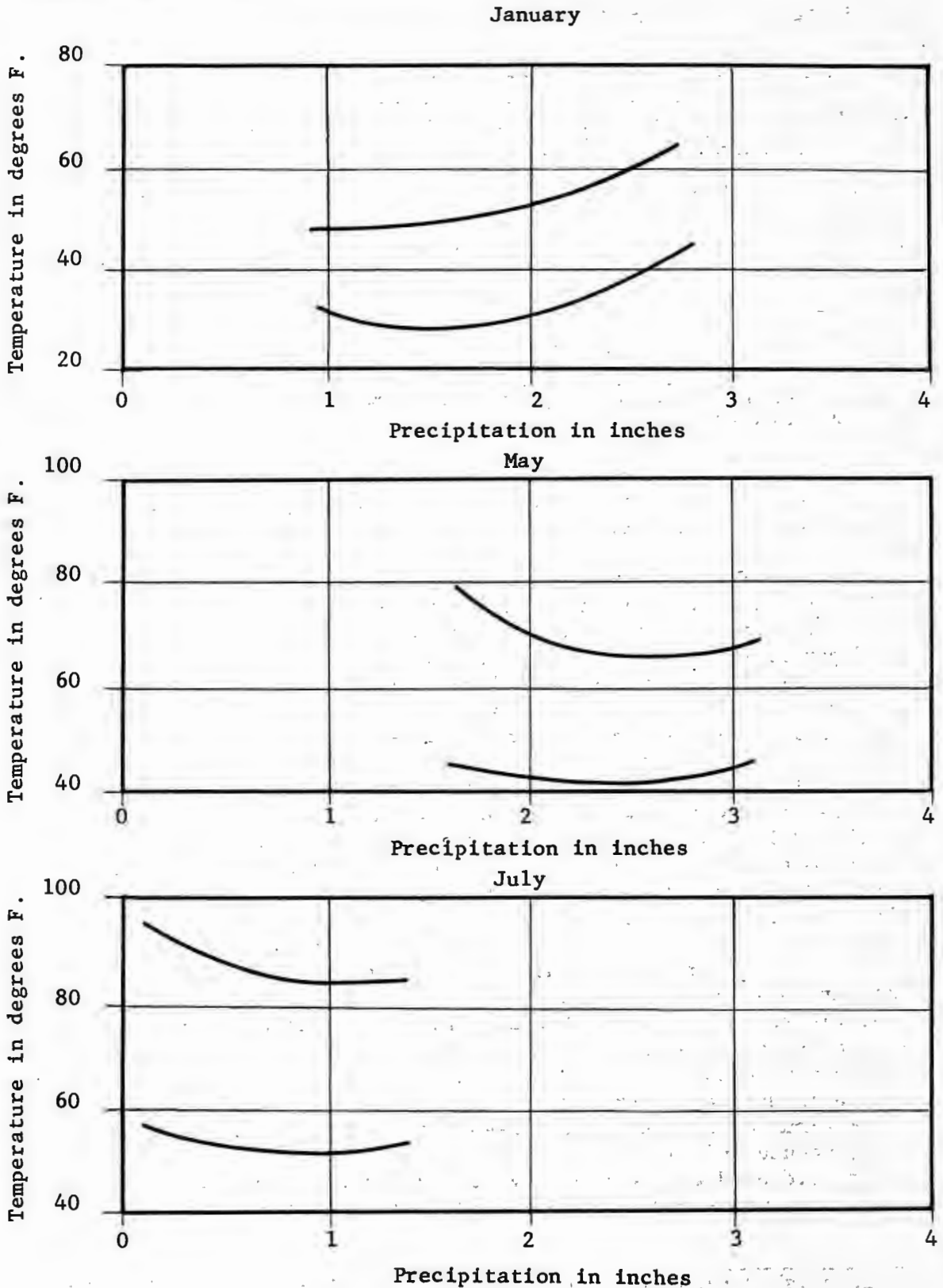
Probably the most critical time for birds is the brood period. Average maximum temperatures for May vary from 64 to 79 degrees in areas of partridge abundance in Spain.

For those who are considering trial introductions of the Spanish redleg into a given locality, figure 10 presents the average maximum and minimum temperatures in relation to precipitation for red-legged partridge habitats in Spain. Three usually critical months, January, May, and July are singled out for attention. One can plot on this figure the average maximum and minimum temperatures in relation to precipitation for these months from the weather records available from as many weather stations as possible in the locality under consideration. If the plottings fall within or adjacent to the curves here given it indicates that, climatewise, the locality might well be favorable for Spanish red-legged partridges. If the area under consideration has somewhat more precipitation with temperatures somewhat lower consideration might well be given to introducing birds from France or England rather than those from Spain.

Extremes -- Spanish partridges are not accustomed to as great extremes in temperature as are their French cousins. Over most of the redleg range in the Iberian Peninsula, winter temperatures seldom fall much below freezing during the day. Periods of a week in which night temperatures fall to 20-30° are not uncommon in northern Spain, and even in Madrid the ground has remained frozen for 2 weeks at a time and a minimum of 10 degrees has been recorded. That birds in good condition, penned and exposed to these conditions, did not suffer from the cold is evidenced by their disregard for warming infrared lights hung in each pen, while birds in poor condition clustered around them.

(a) Unpublished records of the Servicio Meterologico Nacional in Madrid.

Figure 10 -- Average maximum and minimum temperatures in relation to precipitation in red-legged partridge habitats in Spain over three critical months.



In captivity birds of this species will stand temperatures below zero for short periods, providing they are in good condition. Captive breeders, penned throughout the winter at the Price State game farm in Utah withstood 15 consecutive days in which the temperature dropped well below zero (a). Wild-trapped redlegs newly arrived from Spain in the winter of 1957 survived, though with some losses, several days of  $-20^{\circ}\text{F}$ . temperature at the United States Bureau of Animal Industry's quarantine station at Clifton, New Jersey.

Summer temperatures in most parts of Spain seldom go above 100 degrees though a high of 124 has been recorded.

### Predation

Predators of game birds are common throughout Spain although seldom as much in evidence as in the chukar range in the Middle East. Little attempt is made at control, but nowhere was the impression prevalent that losses from predation were high. This idea is worth recording in view of the relatively high abundance of birds in Spain.

Time did not permit carrying out any predator-prey studies, but the number and variety of winged and of ground predators seen in the field was not high. From personal observations and local contacts the situation in Spain by comparison with that of potential Spanish redleg range in the southwestern United States is as follows:

Accipiters and other, slower-flying hawks are equally in evidence. In Spain there is also the so-called partridge eagle (Nisaetus faciatus) which, according to Mr. Quiros, is very destructive to redlegs but is nowhere abundant.

Crows and magpies are much in evidence and are reported to be serious predators on eggs and chicks.

The Spanish equivalent of our great-horned owls are perhaps less common, for shooting the "Gran Duc" (Bubo bubo) over a decoy is a fairly widespread sport. They are considered important enemies of the red-legged partridges.

Foxes are probably more abundant in Spain, particularly in the regions supporting large partridge populations.

Wolves are not common in partridge habitat, and there is, of course, no Spanish counterpart of the coyote.

Snakes are uncommon in Spain.

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(a) Letter from C. Greenhalgh, biologist, Utah Fish and Game Commission.

## Reproductive Capacity

The reproductive capacity of the red-legged partridges in Spain closely resembles that of the chukar as will be seen from the following analysis.

Breeding age -- Redlegs breed the first year after hatching.

Number of eggs -- The normal clutch is 10 to 16 eggs though 20 have been recorded (a).

Brood survival -- Said to be good except in very wet or very dry years.

Life span -- In captivity up to 5 to 6 or more years.

Sex ratio -- Not much out of balance. Of some 2,000 birds caught for the Foreign Game Introduction Project between 1953 and 1957, either by hand, in nets or in snares, there was a slight preponderance of males over females.

Renesting -- Will renest if the first nest is destroyed.

Second broods -- There is some evidence that the female occasionally will lay two clutches of eggs, either raising two broods in the same season or turning one clutch over to the male to incubate and to raise the resulting chicks (a).

## Parasites and Diseases

Almost no work has been done on the parasites and diseases of the red-legged partridges of Spain. Indications are that they suffer from the same maladies as do the chukars. Like this bird, the redlegs are quite resistant to many poultry diseases, for callers held in captivity, often in close association with poultry and under unsanitary conditions, frequently live for 5 to 6 years.

During the course of the investigation many birds were examined by veterinarians associated with the Veterinary School, University of Madrid. Only two maladies, Newcastle disease or fowl pest, and coccidiosis, were commonly identified in the birds held in captivity. Coccidiosis is certainly endemic in the wild redleg population. It is probable, though currently unproven, that some wild birds are also infected with Newcastle disease by association with wide-ranging farm-yard fowl, since this disease is widespread in Spain. After one disastrous experience with Newcastle all birds held in Madrid in captivity by the Foreign Game Introduction project were injected twice, once upon arrival and again 30 days later, with 0.5 cc. of killed Newcastle vaccine. Thereafter no losses from this disease were encountered.

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(a) Unpublished records of observations by Mr. Quiros.

Redlegs in captivity are subject to several diseases.



Figure 11 -- Tests for Newcastle were carried out either with poultry eggs or with 10 day old chicks whenever redlegs, caught by the project, were suspected of disease.



Figure 12 -- All the redlegs collected by the project were injected with killed Newcastle vaccine as soon as they were brought in from the traps.

The only other disease, found in but three birds, was a paratyphoid infection of Salmonella. The type and species were not identified.

As with most partridges some infestations of roundworms and, less commonly, tapeworms were observed in the redlegs held in quarantine pending shipment.

Two external parasites were also observed. Lice were not uncommon and posed a problem when the birds were kept penned for the requisite 2 months before shipment. Accordingly, all birds were dusted against this parasite at the same time as they were injected against Newcastle disease. Ticks, especially about the head, were found on a few birds.

### Analysis of Competing Interests

#### Relation to agriculture

In considering the advisability of introducing a foreign species of game bird into the United States, no question is more carefully considered than that of the species' relation to agricultural pursuits in its native region. Throughout the investigations of the red-legged partridges, close contacts were established, both with the farmers and with the Ministry of Agriculture in each country visited, and this question was always raised, in order to obtain the broadest possible cross-section of opinion.

Generally it is easy to get positive answers to this question if a game bird species is really injurious to crops. In Spain, it was unusual to hear a word of complaint against the red-legged partridges. These birds seem to be universally loved and admired there.

In truth, like the chukars in the Middle East, they have taken their place along with the sunrise and the green of growing wheat in the consciousness of the country people as one of the more rewarding features of country living. If their call, like that of the bobwhite in the South, is missed in early morning their presumed absence from their favorite haunts is a matter of considerable voluble concern.

Yet the redlegs do sometimes feed on crops. In the fall they occasionally graze on sprouted wheat, but I found no record of their stripping the heads of ripening grain. In dry summers and in the fall they will now and then pick a few grapes from a low-hanging bunch, but they showed preference for the over-ripe ones that have already fallen to the ground. Neither of these activities is thought to reduce the yield of these crops in Spain.



Like the chukars, the redlegs eat considerable quantities of waste grain, particularly wheat, oats, and barley. On a winter day flocks are frequently to be seen in the stubble fields adjacent to, or sometimes far from, the shelter afforded by rough lands. They may take an active interest in freshly plowed ground for the tidbits turned up by the plow. But they are not reported to scratch up freshly planted grain or other crops, and the insects that they eat, especially as youngsters, are generally considered to be more than ample payment for their presence in agricultural areas.

### Usefulness

In Spain, in addition to the examples given above, the redlegs fit into the pattern of man's existence in many ways.

As a source of food -- Emphasis is seldom laid on game as a source of food in the United States, but rather on the recreational aspects as an outdoor sport. In Spain this is less true. The days afield when the game bag hung slack are long remembered - as failures.

It is still legal to sell wild meat all over the Iberian Peninsula. Many markets do a thriving business in rabbits and hares, partridges, and pigeons throughout the 4 to 6 months in which shooting is permitted. In a normal year some 4,500,000 pieces of game, mostly rabbits, weighing about 3,500 tons in all, will be sold over the counter of the markets of Spain. Of these, about 226,000 pieces, or about 113 tons, are Spanish red-legged partridges (a). Adding the 2,000,000 birds shot in a normal year and the 55,000 that find their way to the canning factories, the redlegs may be credited with providing some 2,000,000 pounds of meat for the pot.

As a source of income -- Partridges provide a surprisingly large income for many country people as well as for the meatman. Partridge trapping was prohibited in Spain in 1956. Before that, many a village boasted of its group of skilled trappers who throughout the fall and early winter caught birds for the market. Now the trappers are replaced by professional market hunters, although a fair number of the birds sold come from the larger drives or "ojeos".

As a delicacy for the table, partridges are much prized. With the increased demand, the market price has climbed steadily in recent years. In 1953, birds sold for 16 pesetas each; by 1956 the price had climbed to 26 pesetas (60 cents) each. This is only a little less than the wages for a day's work in the country districts.

Throughout the shooting season more birds are killed on "fincas", (farms or estates), where hunting is strictly controlled, than in the open countryside where it is free. Redlegs are the main game shot. The

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(a) Records from the Casa Registrada in the Mercado Central de Madrid.

shooting rights for a farm often bring from 20,000 to 60,000 pesetas (\$466-\$1,395) a season, depending on the abundance of birds. In such situations it is no idle jest to say that the partridge crop may pay the taxes on a farm.

One other source of income should be mentioned. The frequent drives or ojeos are often well-organized affairs requiring the services of from 20 to 70 or more beaters, one or two secretarios per gun, and many other helpers. A good beater gets 30 to 50 pesetas a day; secretarios are paid from 50 to 100 pesetas depending on their ability to load guns, to gather birds, and to filch a few of those shot by neighboring sportsmen on each drive. Thus the wages paid on the several thousand ojeos organized each year amount to a substantial figure.

As pets and as callers for hunting -- While it is not uncommon to find adult partridges in cages, they do not tame as readily as do the chukars. Relatively few, therefore, are kept as pets or to provide life and decoration in the garden.

In former days many a hunter with a taste for partridges possessed two or three tame birds to be used in calling their wild brethren within range of his gun. This is now illegal, but the law may still be more honored in the breach than by observance, for to find several birds, each in its beehive, wicker cage, tenderly cared for by one village nimrod is not uncommon. The normal life span for these captive birds is 5 or 6 years though records of 10 to 12 years are said to exist.

As fighting birds -- The redlegs are by no means as pugnacious as chukars. Thus mains are much more accidental and occasional affairs than is the case with chukars in the Middle East where hundreds of liras, dinars, or rials change hands with the death of a fighting bird. Only the male redleg is used for this purpose.

As a game bird -- In the Iberian Peninsula no other game is as much sought-after by city and country folk alike as is the red-legged partridge. The same is true in southern France but in northern France and southern England the redleg is less sought-after than is the Hungarian partridge and the pheasant because of its habit of learning quickly to run rather than to fly before the hunter in the field.

In Spain hunting pressure on lands open to hunting is substantial. The species might long ago have been much reduced in numbers except for its great recuperative capacity and the protection afforded it on farms, estates, and forest reserves where hunting is controlled.

Inherently not shy birds, redlegs learn rapidly to run and fly well ahead of the sportsman wherever they are heavily hunted. Fast fliers and artful swervers with keen eyes for danger, they are well able to care for themselves. Inhabiting agricultural and rough lands alike, but not being addicted to the mountainous country and steep terrain as are the chukars, the redlegs provide at least 80 percent of the shooting for sport in Spain. In a bumper year up to 3,000,000 and in a normal year some 2,000,000 birds are shot in Spain without cutting too deeply into the breeding stock left for the succeeding season. This represents an astonishing harvest for a country only slightly larger than the State of California.

Only three hunting methods have been commonly practiced. Birds may be lured within range of the gun with the aid of live callers set in a cage in a likely covert. Males, mostly, are attracted and are shot on the ground. This practice has recently been outlawed.

The most common way of shooting redlegs in the open country is to walk them up either with or without a dog. Parties of 3 to 15 hunters form a rough line and advance through likely cover, shooting such birds as do not run or fly up out of range. Where the birds are not much hunted, fair bags can be had by this method though only with a knowledge of the country and of the habits of the birds and then with the assistance of a serviceable set of legs. Some birds lie well to a dog, especially in windy or rainy weather but, like pheasants, most soon learn to keep well ahead of the hunters.

Hunting over dogs is practiced mostly in northern Spain, which is less arid. Around Burgos and Palencia a special breed of short-haired pointing dogs called "pachon" or "perdiguero" have been developed for partridge hunting. These dogs, like pointers, have keen noses but are quiet and slow of movement so as not to flush the birds well out of range.

The real delight of the well-to-do partridge enthusiast is the ojeo or drive. This method, introduced some 200 years ago from England as a sport of royalty, now accounts for perhaps one-half of all the birds shot in Spain. Most fincas or farms organize 2 to 5 ojeos a year, although the same coverts are seldom driven more than two or three times a season if the hunts are well managed.

Small ojeos are often conducted on an informal basis, but the larger ones are highly organized. In these, 40 to 75 beaters, with much shouting, whistling, and clatter of sticks, slowly drive the birds, often from an area a mile or more square, to the guns. Six to eight shooters usually take part. Each gunner occupies his own butt. These blinds are built shoulder high of brush and are placed 50 to 150 yards apart in a row. Each shooter is provided with 1 or 2 secretarios to load the guns, pick up the birds, and carry game and equipment.

A well-organized ojeo is a hunt long to be remembered



Figure 13 -- The beginning and the end of an ojeo. Then is the time for sociability.



Figure 14 -- The shooter is often accompanied by "secretarios" to load his guns and to gather his birds after the drive is completed.

A well-organized ojeo is a hunt long to be remembered



Figure 15 -- A bird over the butt. Sometimes a dozen will come hurtling past in the space of a few seconds.



Figure 16 -- A morning's bag for six guns. On this estate pheasants were raised and liberated for shooting along with the redlegs.

As in olden days, the start of the drive is signalled by the pleasant bugling of hunting horns or by a blast from a shotgun. For the first 5 to 10 minutes thereafter the shooter hears only the rapid pounding of his heart and the lazy swish of an occasional crow or magpie disturbed by the distant beaters. But as the noise of the beaters becomes increasingly clear, the partridges, first singly or in pairs, start coming over, often high, wide, and fast. If there are many birds, the last 5 minutes of the drive can be a time of wild excitement to all but old hands, with birds passing the butts at express-train speed singly or in scattered groups of 10 to 30. At such times a crack shot may keep 2 or even 3 hot, double-barreled guns shuttling between him and his secretarios with such agility as to have 3 or even 4 shot birds in the air at one time.

The normal practice is to put on five or six drives, each to a different set of butts, in a day. From these a total bag of 150 to 400 or more birds may be expected. On the occasional big shoots the number of birds loaded on the burros at sundown may exceed a thousand. The all-time record is reported to be over 7,000 partridges fallen to 12 guns in 1 day, with a 2-day bag of 12,000 birds.

To the average American sportsman, except when he is hunting in Spain, the big ojeos may seem like slaughter. But the butts are often so placed as to make shooting extremely difficult so that to make a large bag a high degree of skill and coordination is required. The birds are always killed in the air, usually clean, and the surplus is sold in the market for food. It is more shooting than hunting and, of course, does not possess the advantage of mass participation and individual initiative characteristic of much of the hunting in America.

Surprisingly, in the management of the Spanish redleg as a crop the ojeo plays an important and constructive part. As previously indicated, most drives over a given area are scheduled only so long as a surplus of birds are present and are discontinued promptly when the numbers have been reduced to the minimum necessary to insure a good crop in the following season. To provide good shooting is a social and business asset in Spain; a finca with good cover and poor shooting is often a matter of considerable concern to its owner. Thus over the years when most lands open to general hunting have been badly overshot, the fincas with their ojeos have played a large part in sustaining the overall abundance of the red-legged partridges in the Iberian Peninsula.

Like the chukars, redlegs are amazingly tough, resourceful birds and quite capable of maintaining themselves, once successfully introduced, under American hunting practices and of providing excellent sport.

## Competition with other game species

In Spain, the Hungarian partridge (Perdix perdix hispaniensis) and the migratory quail (Coturnix coturnix) are the only other gallinaceous birds that are native within the range of the red-legged partridge. Huns and redlegs may occasionally be found in close proximity and since the food habits of the two species are somewhat similar there is always the possibility of competition for food where it is scarce. In Spain and from southern France and England, where these birds are common and usually occupy adjacent coverts, no reports of serious competition for food or shelter have been received, though the question has often been raised. In captivity it is possible to pen chukars, Spanish redlegs, and Huns together without much difficulty.

## Handling Techniques

### Trapping methods

Throughout Europe and Asia, amazingly ingenious and effective methods of catching partridges have been devised. To this Spain is no exception.

Perhaps the most common and efficient method employed is to throw together a flimsy fence of weeds and branches. About 18 inches high and from one-quarter to one-half a mile long, it is usually built across open fields or through brushy areas. In this fence small openings are left at intervals of from 20 to 40 feet. In each opening are rigged four horsehair snares suspended from a U-shaped wire set loosely in the ground. As a variation of this, a hole, some 10 x 15 x 14 inches deep, is dug in each opening. Over this is placed a wooden trap door which is covered lightly by earth and leaves. These preparations completed, the birds are driven rather slowly to the fence by from 15 to 50 beaters much as in an ojeo. Depending upon the wind, the weather, and the skill of the trappers, from 5 to 25 percent of the birds rounded up will be caught. The birds that are snared usually struggle briefly then settle down quietly until the beaters arrive. The horsehair nooses stay tight about the neck only while the birds are pulling on the snares and open to permit breathing as soon as they are quiet. Foot snares are occasionally used in place of head nooses but are much less effective.

A second, more picturesque, and equally effective method consists in catching the birds by hand on still, dark nights at their roosting places. Equipped with a strong flashlight or old acetylene-gas lantern and with bells attached to pants legs to deaden the noise of his footsteps a man cautiously approaches the covey. Confused by light, about three out of five birds may then be caught by hand. Those that are frightened usually fly only a short distance and can be marked down and caught singly.



Trapping the red-legged partridge in Spain



Figure 17 -- The fence of weeds and brush to which the partridges are driven is often built across an open field.



Figure 18 -- Partridges, driven by beaters through the openings in the fence, are usually snared by the neck.



Trapping the red-legged partridges in Spain



Figure 19 -- At the conclusion of the drive the birds are removed from the snares. Few are injured.



Figure 20 -- If the catch is good one trapper removes the birds while another carries them to the shipping boxes.

## Artificial propagation

It is an interesting commentary that, as long as a species is common and available, man seldom attempts to propagate it by artificial means. Thus it is not surprising to find few instances of red-legged partridges being bred in captivity in Europe. From the records available, one gathers that the species is intermediate between the chukar and the Hungarian partridge as regards the problems encountered in propagating it on a game farm or in an aviary.

In Spain, at El Alemain, the estate of the Duke of Rusinada, a few of these birds have been bred along with ring-necked pheasants and the American bobwhite quail. In France, aviculturists have successfully raised broods of redlegs from time to time although I know of no serious attempt to rear them by hundreds. Spurred on by the growing demand for more birds in France, M. Laurent, within the last few years, has propagated upwards of a hundred redlegs through several generations, mostly in rooms artfully decorated to resemble natural conditions (a). Such artifices are unnecessary, however, as has been demonstrated in England. There, at the Imperial Chemical Industry's Game Research Station at Fordingbridge, under the direction of Mr. A. D. Middleton, these partridges have been raised under modern game-farm conditions. Little difficulty has been experienced in incubating eggs in an incubator and in raising the resulting chicks artificially in coops and pens, utilizing equipment and methods designed primarily for Hungarian partridges (a).

Interest in propagating this species for release has recently been evidenced in the United States. Using methods similar to those employed in the large-scale production of chukar partridges, Mr. Harry J. Figge, biologist with the Colorado Game and Fish Department, kept from 21 to 40 wild-trapped Spanish redlegs, mostly culls and cripples, in pens for 3 years. These birds eventually became rather tame but, as is normal with most wild-caught game, did not lay many eggs in captivity. From 23 eggs that were fertile, 20 youngsters were raised during the course of the experiment. A few of these were second-generation birds. The records of this work are presented in table 4. Unfortunately, with the sale of the farm, the experiment was concluded with the release of the birds (a).

Similar experiments on a smaller scale have been underway for several years on the Price State game farm of the Utah Department of Fish and Game. Several pairs of wild-trapped redlegs have been confined there since 1955. No eggs were laid even though pairs were kept in wire-floored pens, as well as in pens on the ground. In one case a pair was confined to a season in a brushy enclosure some 7/10 of an acre in area (b).

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(a) Personal letter to the author.

(b) Personal letter from Mr. Clifton M. Greenhalgh.

Table 4 -- Some results of breeding experiments with Spanish red-legged partridges at the Colorado State game farm- 1952-1954.

Year	No. of breeders	Eggs collected		Young birds	
		Fertile	Infertile	Hatched	Raised
1952	21	0	8	0	0
1953	24	9	0	8	8
1954	40	14	0	12	12

There are a number of private game breeders in the United States who have successfully raised small numbers of French red-legged partridges in captivity utilizing hand-reared birds as breeding stock. Up to the present, however, too few birds, fresh from the wild, have been available and interest in the propagation of this species has not been sufficient to encourage any large scale attempts at artificial propagation.

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