

Food Habits of Juvenile Sage Grouse¹

DONALD A. KLEBENOW AND GENE M. GRAY²

Graduate Students, Idaho Cooperative Wildlife
Research Unit and Zoology Department,
University of Idaho, Moscow

Highlight

This study indicated the importance of forbs to sage grouse chicks. Only during the first week of a sage grouse's life did insects predominate in the diet. After that week, forbs became the most important food. Shrubs were taken in small amounts at first but progressively increased in importance as the chicks grew older. In sage grouse management, it is important that we recognize that forbs are a necessary part of the habitat.

The use of sagebrush eradication as a range improvement technique to increase production of livestock forage has aroused concern for the birds and mammals that live in the sagebrush environment. Sage grouse (*Centrocercus urophasianus*) are directly affected, but the need to manage sage grouse habitat has been handicapped by the lack of information on the environmental needs of the bird.

This paper presents the results of the analysis of 44 juvenile sage grouse crops collected in southeastern Idaho from June 4 to August 17, 1965. Our objective was to obtain data on the food of chicks, by weekly age classes, from the hatch until brood break-up at eight to ten weeks of age.

Literature exists on the food habits of juvenile sage grouse, but none apparently covered all chick age classes under natural conditions. An Oregon study of six artificially reared sage grouse indicated that ants and forbs were the chief foods for the first six weeks (Batterson and Morse, 1948) and information from young birds collected in Utah (Rasmussen and Griner, 1938) and Wyoming (Patterson, 1952) showed the same relationship. Shrubs became more important as the age progressed; sagebrush (*Artemisia* sp.) was by far the most important. Patterson (1952) also found some rabbitbrush (*Chrysothamnus* sp.) in the summer diet.

Study Area and Procedures

Juvenile birds were collected in Clark County, Idaho. Twenty-six were taken from one study area on the U.S. Sheep Experiment Station located between 5,400 and 6,000 ft elevation on the Upper Snake River Plains. The other 18 chicks were collected on a study area in the Medicine Lodge Creek drainage, about 10 mi west of the U.S. Sheep Experiment Station. This study area included a portion of the Upper Snake River Plains at about 5,200 ft elevation, and extended north into the adjacent hills to the Idaho-Montana border, elevation 7,700 ft. The birds were all collected while in native sagebrush-grass habitat. The major plant species in the study areas were: big sagebrush (*Artemisia tridentata*), lanceleaf rabbitbrush (*Chrysothamnus viscidiflorus* var. *lanceolatus*), antelope bitterbrush (*Purshia tridentata*), gray horsebrush (*Tetradymia canescens*), thickspike wheatgrass (*Agropyron dasystachyum*), bluebunch wheatgrass (*A. spicatum*), Nevada bluegrass (*Poa nevadensis*), Sandberg bluegrass (*P. secunda*), rose pussytoes (*Antennaria rosea*), purpledaisy fleabane (*Erigeron corymbosus*), arrowleaf balsamroot (*Balsamorhiza sagittata*), and tailcup lupine (*Lupinus caudatus*).

When collecting, not more than one bird was taken from a brood. After shooting, the crop was removed and the contents air dried to stop bacterial action on the food particles and prevent discoloration. A brief check of the plant material was usually made and unknown items were compared with vegetation where the bird was collected. Identification notes made in the field were of great aid later in the final laboratory identification. In the laboratory the food items were moistened to permit separation, examined with a seven to 30 variable power dissecting scope, and identified. The volume of each food item was determined by the displacement of water in a graduated cylinder. These volumes were lumped by age class, providing a total volume for each weekly period and the percent volume of each food item was calculated.

Results

Our original plan was to collect six juvenile birds a week for the first eight weeks of age, but the outcome resulted in the sample sizes listed in Table 1. In week three we had only two chicks, one with just a trace of material in the crop and the other with a very small amount (0.5 cc). The material was 88% insects. This large percent of insect matter was opposite the normal food item pattern and we have not included this age class in any further discussion. The eighth week sample was only two birds, so we placed all the oldest birds in a single class, eighth to tenth weeks.

Table 1 contains all the food items which occurred in volumes of 1% or more per age class.

¹Paper presented at the 20th Annual Meeting, American Society of Range Management, Seattle, Washington, February 16, 1967. It is a joint contribution of the Idaho Fish and Game Department and the Idaho Cooperative Wildlife Research Unit (University of Idaho, Idaho Fish and Game Department, U.S. Fish and Wildlife Service, and the Wildlife Management Institute cooperating).

²Present addresses: D. A. Klebenow, Department of Agronomy and Range Management, Texas Technological College, Lubbock; G. M. Gray, Route 2, Hansen, Idaho.

Table 1. Summary of food items comprising a volume of one percent or more of each age class of juvenile sage grouse, 1965. Sample size in parentheses.

Food item	Age (weeks)															
	1st		2nd		3rd		4th		5th		6th		7th		8th-10th	
	(4)		(4)		(2)		(5)		(7)		(9)		(7)		(6)	
	% volume	% frequency	% volume	% frequency	% volume	% frequency	% volume	% frequency	% volume	% frequency	% volume	% frequency	% volume	% frequency	% volume	% frequency
FORBS																
Common Yarrow (<i>Achillea millifolium</i>)							1	20	tr	14	8	22	2	29	tr	16
Mountain Dandelion (<i>Agoseris</i> sp.)											2	11				tr
Loco (<i>Astragalus convallarius</i>)			25	75			10	80	1	29	5	33	12	57	tr	33
Sego Lily (<i>Calochortus macrocarpus</i>)							3	40	3	29	9	44	23	43	6	16
Paintedcup (<i>Castilleja angustifolia</i>)	1	25											3	29		1
Tapertip Hawksbeard (<i>Crepis acuminata</i>)			25	25	tr	50			tr	14						1
Prickly Lettuce (<i>Lactuca serriola</i>)											6	33			tr	16
Harkness Gilia (<i>Linanthus harknessii</i>)	45	50	12	25			6	40	tr	14	1	22				1
Nuttall Monolepis (<i>Monolepis nuttalliana</i>)									tr	14	2	11			1	16
Phlox (<i>Phlox longifolia</i>)			2	25												tr
Common Dandelion (<i>Taraxacum officinale</i>)			25	25			48	60	88	100	25	67	27	71	57	84
Goatsbeard (<i>Tragopogon dubius</i>)							8	40	2	14	27	56	11	71	7	16
SHRUBS																
Big Sagebrush (<i>Artemisia tridentata</i>)							1	40	1	14	6	22	11	14	14	50
Threetip Sagebrush (<i>A. tripartita</i>)									1	14			1	14		tr
Lanceleaf Rabbitbrush (<i>Chrysothamnus viscidiflorus</i> var. <i>lanceolatus</i>)													1	29		tr
TOTAL PLANT VOLUME	48	75	90	100	14	50	77	100	98	100	93	100	91	100	85	100
INSECTS																
Ants (Formicidae)	5	75	3	75	tr	100	4	80	1	86	2	78	2	86	12	100
Leaf Beetles (Chrysomelidae)							tr	40			2	56	2	43	2	16
Ladybird Beetles (Coccinellidae)			1	25	tr	50	1	60	tr	14	tr	22	tr	14	tr	33
Weevils (Curculionidae)			tr	50			1	60					tr	14		tr
Lamellicorn Beetles (Scarabeidae)	45	25	5	25			1	40	1	14	1	22				1
Darkling Beetles (Tenebrionidae)							1	20								tr
Beetle Larvae	2	25	tr	25	tr	50	11	40	tr	14	1	33	tr	29	tr	50
Grasshoppers (Locustidae)											tr	11	5	29	tr	16
Lace Bugs (Tingidae)							1	20								tr
Eruciform Larvae							3	20								tr
TOTAL INSECT VOLUME	52	75	10	100	88	100	23	80	2	86	7	78	9	100	15	100

In the first week insects were very important—52% of the total diet. Beetles, primarily family Scarabaeidae, were the main food item. Beetles were taken by all other ages of chicks, but in smaller amounts. All ages fed upon ants and while the volume was generally low, ants were found in most of the crops. After week one and excepting week three, the insect volume dropped and stayed at a lower level throughout all the age classes, fluctuating but always under 25%.

Forbs were the major plant foods of the chicks. Harkness gilia (*Linanthus harknessii*) was the main forb species in the first week and then steadily decreased. It was not found in the diet after six weeks. Loco (*Astragalus convallarius*) and dandelion (*Taraxacum officinale*) were important

food items for most of the collection period and they occurred with generally high frequencies. Dandelion was the most abundant food item and the mainstay of the sage grouse chicks. At six weeks of age, goatsbeard (*Tragopogon dubius*) reached its peak in the diet and sego lily (*Calochortus macrocarpa*) were found in greatest volume a week later. These five species were the most important forbs. The only shrub of importance was big sagebrush. It appeared in the diet at four weeks of age and as the ages progressed, the volume increased steadily. These six plants comprised 83% of the total sample.

In Table 2 these six major food plants are listed in the order of decreasing percent total volume and the specific parts taken are given. Other plants

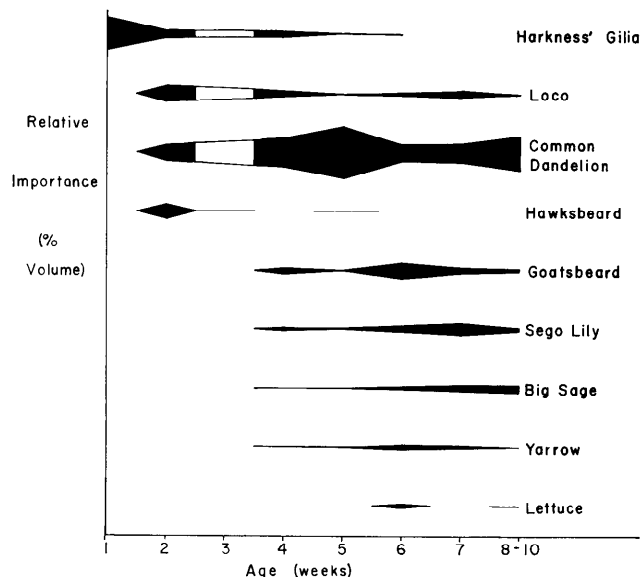
Table 2. Specific parts of the major plant food items identified from 44 juvenile sage grouse crops, 1965.

Food item	Part	Percent of total
Common dandelion	buds, seeds	80
	leaves	20
	stems	tr
Total		100
Goatsbeard	buds	86
	leaves	5
	stems	9
Total		100
Sego lily	buds, capsules	100
Big sagebrush	leaves	100
Loco	flowers, buds	100
Harkness gilia	capsules	100
Other plants	buds	19
	flowers	5
	capsules	9
	seeds	tr
	seed heads	7
	berry	1
	leaves	59
Total		100

comprised 6% of the total volume and their specific parts are listed last in the table. With plants like common dandelion and goatsbeard, all parts of the plant above the ground were sometimes eaten. The stems, however, were not of main importance. The reproductive parts, mainly buds, flowers, and capsules, were the most common items in the crops. The reproductive parts were the only parts taken from some of the other species. Conversely, leaves were the only parts of sagebrush found in the crops.

Those plants that were over 5% in volume in the weekly age classes are plotted in Fig. 1. This indicates their relative importance and shows how the birds progress from one food item to another. This progression paralleled plant phenology. Species such as loco and dandelion grew and bloomed throughout most of the summer, thereby providing food for a long period. Other plants such as Harkness gilia, tapertip hawksbeard (*Crepis acuminata*), goatsbeard, and sego lily grew and matured within a shorter period. When the plants dried, juvenile grouse ceased to feed upon them. Near the end of the collecting period, big sage was partially compensating for the decrease of some forbs in the diet, however, common dandelion was still the main food item.

Seventeen food items that were less than one percent of the volume of each age class are listed in Table 3 in terms of their frequency and the age when used. Important were *Lepidium densiflorum*, *Capsella bursa-pastoris*, and other items from the Cruciferae family. Also prominent were members of Compositae, Graminae, unknown plant material,

**FIG. 1.** The relative importance of the plant food items, over 5% volume, found in juvenile sage grouse crops, 1965.

beetles (either ground beetles (Family Carabidae) or other members of Coleoptera), and members of the order Hemiptera which included families Lygaeidae and Coreidae.

Discussion

These crop samples indicated the importance of forbs to juvenile sage grouse. A pattern similar to this occurs in adult birds. However, adults consume more sagebrush during the summer months; seldom is there less than 25% of this food item in their diet (Patterson, 1952; Rogers, 1964).

Table 3. Summary of food items comprising less than one percent volume of each age class of juvenile sage grouse, 1965.

Food item	Percent frequency	Week when used
Plant		
Cruciferae	5	6
<i>Lepidium densiflorum</i>	7	5, 6, 7
<i>Capsella bursa-pastoris</i>	2	6
Compositae	7	2, 6, 8-10
Graminae	7	6, 8-10
Polemoniaceae	2	6
<i>Symphoricarpos oreophilus</i>	2	7
Unknown	11	2, 3, 4, 8-10
Insect		
Hemiptera	16	2, 3, 6, 7, 8-10
Lygaeidae	11	2, 4, 5
Coreidae	5	2, 6
Coleoptera	5	2, 3
Carabidae	16	3, 4, 5, 6, 7, 8-10
Diptera	5	4, 5
Cicadellidae	2	6
Pupae	2	5
Unknown	2	3

Although the food items, common dandelion, goatsbeard, and prickly lettuce (*Lactuca serriola*), are introduced weeds, all the plants taken were ones that are found on the sagebrush-grass ranges of the study areas. These native ranges that are the habitat of sage grouse broods may be quite large in size. Sage grouse usually migrate to summer ranges at higher elevations and our birds ranged over areas from 5,200 ft elevation to over 7,000 ft, covering distances from five to 15 mi.

To manage these native ranges for sage grouse we must recognize the importance of the forb components of the habitat. Spraying these ranges for sagebrush control removes the forbs, thereby creating an environment unsuitable for juvenile

sage grouse. This is a side effect not usually considered and a factor that must enter the management decision.

LITERATURE CITED

- BATTERSON, W. M., AND W. B. MORSE. 1948. Oregon sage grouse. Ore. Game Comm. Fauna Ser. 1:1-29.
- PATTERSON, R. L. 1952. The sage grouse in Wyoming. Sage Books, Inc., Denver. 341 p.
- RASMUSSEN, D. I., AND L. A. GRINER. 1938. Life history and management studies of the sage grouse in Utah, with special reference to nesting and feeding habits. Trans. N. Am. Wildl. Conf. 3:852-864.
- ROGERS, G. E. 1964. Sage grouse investigations in Colorado. Tech. Publ. No. 16, Colo. Game, Fish and Parks Dept. 132 p.