

and rested. No gobbling was observed at the tank in the evening, but males occasionally chased one another at the water's edge.

Drought conditions existed throughout all study areas during March and April. The only measurable precipitation received during these two months was 4 inches of snowfall on 31 March. This snowfall resulted in 0.56 inches of precipitation. The 25 year average for March and April is 0.53 and 0.79 inches, respectively. In early May, there were frequent showers and the vegetation began to "green up"; also there was normally a heavy morning dew. The total precipitation for May was 2.56 inches. The 25 year average is 1.92 inches (U.S.D.A. records). The use of stock ponds by Lesser Prairie Chickens coincides with this period of drought and eased when the drought was relieved.

The differences in water utilization at the various study areas likely reflect the availability of water in the habitat from other sources. For example, diet is undoubtedly of importance in this respect as Lesser Prairie Chickens perhaps do not necessarily require abundant free water in the spring. This species commonly inhabited arid regions prior to settlement and the concurrent development of water resources. However, Lee (J. Wildl. Mgmt., 14:475-477, 1950) reported that populations of Lesser Prairie Chicken decreased during drought years. The reasons for such declines are no doubt complex, but it seems quite probable that the advent of man-made stock ponds may now enhance survival of Lesser Prairie Chickens during periods of spring drought.—JOHN A. CRAWFORD AND ERIC G. BOLEN, *Department of Range and Wildlife Management, Texas Tech University, Lubbock, Texas 79409, 2 February 1973.*

Precocious lek behavior in Sharp-tailed Grouse Chicks.—It is known that juvenile Sharp-tailed Grouse (*Pedioecetes phasianellus*) are able to take part in lek displays as early as their first autumn (Lumsden, Ontario Department Lands and Forests, Rep. No. 6, 1965; R. J. Brown, in prep.), but the earlier development of these displays appears not to have been examined in detail for this species. The precocious occurrence of "dance" displays was reported for young grouse by Ernest Thompson Seton (Trail of an artist naturalist, Scribners, N.Y., 1940) but has not, to my knowledge, been reported elsewhere. Observations that I made, on three occasions, of this phenomenon in 3- and 4-day-old hand-reared chicks, are reported here.

On the first occasion, as my hand containing a chick was moving past another, the latter lowered its head, and with neck outstretched, beak slightly open, wings spread and curved downward, tail up, and feet stamping rapidly, followed my hand across the box. This behavior pattern appeared to be identical to the tail-rattling portion of the lek display (Lumsden, loc. cit.; pers. obs.). This behavior was next observed on two occasions during the following day, when the chicks were four days old. On one of these occasions the behavior pattern was elicited in the same manner as described above, on the other occasion, simply by opening the box in which the chicks were being held. Subsequent dissection showed the gonads to be less than 1 mm in diameter, and not hypertrophied. My observations of this phenomenon agree with Seton's completely, except that the chicks I observed were younger, no crowing occurred and only one of the chicks danced at a time.

By presenting relatively intense stimuli to domestic chicks, Andrew (Anim. Behav., 12:542, 1964) produced various calls similar to those produced in chicks injected with testosterone. More recently, Vidal (Behaviour, 39:20, 1971) has described adult-like sexual responses in domestic cocks as young as 4 days of age. The fact that Sharp-tailed Grouse chicks can exhibit a complex behavior pattern similar to that shown by adult males on the dancing-ground indicates that in this species, one can similarly relate such

early behavior to adult sexual behavior, and that the mechanism underlying at least some parts of the complex behavior patterns associated with the courtship ritual are present at, or shortly after, hatching.

As well as sexual components, a considerable number of aggressive components are also present in the courtship display of the Sharp-tailed Grouse (Lumsden, loc. cit.). In one-day-old Red Grouse chicks, Watson and Jenkins (Brit. Birds, 57:137, 1964) describe attempts to "sing" on the ground in characteristic adult posture. The young Red Grouse also exhibited several other adult-like aggressive displays. Reactions towards an imprinting or other object may also contain aggressive components in young domestic chicks (Andrew, loc. cit.; Evans, Anim. Behav., 16:24, 1968). These results raise the possibility that tail-rattling in Sharp-tailed Grouse chicks may also contain elements of aggressive behavior. This hypothesis seems to agree with what has been observed, and perhaps offers a superior alternative to the explanation that these responses represent precocious sexual behavior. Possibly the ultimate interpretation of phenomena such as precocious tail-rattling in Sharp-tailed Grouse involves elements of both hypotheses reviewed here. In either case, it seems likely that the complex and highly competitive mating system of the Sharp-tailed Grouse may have favored the very early development of many of the motor components of the displays associated with reproduction.

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Energetics of a Spotted Sandpiper feeding on brine fly larvae (*Paracoenia*; *Diptera*; *Ephydriidae*) in a thermal spring community.—The Spotted Sandpiper (*Actitis macularia*) a very adaptable shore bird, is found in both marine and fresh water habitats (Bent, U.S. Natl. Mus. Bull., 146:78-97, 1929). We have observed a Spotted Sandpiper feeding in a habitat which we believe has not been previously reported. Several meadows throughout Yellowstone National Park have flowing hot springs ranging in temperature from 35 to 70 C. Many of these hot spring effluents support blue-green algal mats with large populations of grazing flies. Herbivorous flies complete their entire life cycles in the mat matrix and both larval and adult stages feed upon the blue-green algae. Such thermal communities contain a rich animal food source which we found was exploited by Spotted Sandpipers.

The predominant substrate upon which hot spring algal mats develop is silica; however virtually identical blue-green algal mats grow on artificial substrates such as wooden platforms (Wiegert and Fraleigh, Limnol. Oceanogr., 17:215-228, 1972). The particular sandpiper which we studied fed upon insects found in mat systems throughout the meadow. Most of its feeding, however, occurred upon mats on elevated wooden platforms one meter wide and 24 meters long. Effluent from a hot spring (56 C, pH 6.0) was piped to each of two platforms at 30 liters per minute. The two large algal mats were similar to the several surrounding blue-green algal mats found in the meadow except that the formers' boundaries were clearly defined and effluent inputs and outputs from the boards could be accurately determined. Both algal mats supported a very large population of grazing flies, most of them *Paracoenia turbida* Cresson, Ephydriidae. Each summer since 1969 one Spotted Sandpiper has been feeding almost daily from the platforms. This note