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Recent Success in Raising Ruffed Grouse in Captivity

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Abstract: With low investment in equipment and effort, the Michigan Department of Conservation raised 126 ruffed grouse to ages of 5 to about 9 weeks for experimental stocking. Eggs from wild nests were hatched in an electric incubator. The chicks were reared under electric brooders in outdoor and in indoor facilities. They were fed exclusively commercial game-bird starter ration supplemented with small amounts of greens and provided drinking water medicated with an antibiotic. Hatching success from 219 eggs was 77%. Grouse survival was 76% of chicks started. These results demonstrated that it is feasible to raise ruffed grouse in limited numbers for special purposes.

Accounts of early attempts to raise ruffed grouse in captivity repeatedly tell of failures, or, at best, success through rather elaborate procedures and under considerable difficulty (Allen, 1929, 1931; Handley, 1930). Problems with diseases were subsequently reduced through improved sanitation and the substitution of the artificial incubator and brooder for the setting hen. Bump (in Bump et al., 1947:45) for instance, reports that the New York Conservation Department raised some 2,000 ruffed to maturity in the years 1931 to 1942. He devotes a chapter to an excellent discussion of and detailed instructions on methods for raising grouse. From this chapter, however, one might conclude that grouse are still very difficult to raise and require special treatment and elaborate facilities. Edminster (1947:56) acknowledges that great advances have been made in artificially raising ruffed grouse but concludes that artificial propagation is not yet practical for restocking purposes.

Indiscriminate or large-scale stocking is not warranted in present-day grouse management. Useful purposes can be served, however, through raising and maintaining grouse in captivity for research and for stocking in special situations. Hand-reared grouse may be used in disease and physiological studies under controlled conditions. Grouse raised artificially have an advantage in that they may be kept free of the parasites common to wild grouse. I believe that agencies planning to introduce grouse in suitable habitats not already stocked with grouse should consider the desirability of using birds that are free of parasites.

Since 1958 we have had, with a low investment in equipment and effort, rather unusual success in raising ruffed grouse at the Rose Lake Wildlife Research Center to ages of 5 to about 9 weeks for experimental stocking. Details of the experimental stocking appear elsewhere in this issue of the Journal. The intent of this paper is to describe the methods we used to raise the grouse. Our success further suggests that now, with improved feeds formulated through better understanding of

nutritional requirements of birds, and the control of disease through the use of antibiotics and other disease-inhibiting substances, it is feasible to raise ruffed grouse on a limited scale for special purposes.

Materials and Methods

Our methods were essentially those commonly used for raising pheasants and other game birds as well as chickens. The principles are the same. I feel that it is not important to prescribe an exact procedure and will discuss in general terms adaptations which we followed. No doubt many innovations might be made.

Source of eggs:

Eggs were obtained from nests found in the wild. We originally thought that eggs from incomplete clutches would not be incubated and could be held for a few days at a cool temperature in the field until convenient to send them to Lansing by messenger. This proved to be a mistake because most of the eggs collected were partially incubated, and the embryos did not survive storage for a few days. On the other hand, eggs picked up and transported directly to the incubator within a day had a high hatching success. I assume there would be no difficulty in transporting embryonated eggs for considerable distances if provision were made to prevent their chilling. I suggest that anyone contemplating raising grouse read the chapter on artificial propagation by Bump (in Bump et al., 1947).

Incubation:

The eggs were hatched in a small electric still-air incubator. Moisture was provided by a tray of water on the floor of the incubator chamber. The temperature at the level of the eggs in the hatching tray was maintained at 99½° F. To keep individual clutches of eggs intact we surrounded each with a cylindrical "fence" of hardware cloth. The chicks were held in the incubator until they dried off and became fairly active. About 24 hours after hatching they were transferred to a brooder pen.

Rearing facilities:

Since grouse are very susceptible to diseases of chickens and other birds, we placed our pens in an area where poultry or game birds had not been kept in recent years. Strict sanitation was maintained to avoid exposing feed, water, and equipment intended for grouse to poultry and other birds.

In 1958 we began the project with the following equipment. We made three small brooder houses with screened runs attached (Fig. 1), because we wanted facilities for raising several small groups of grouse. The houses were made of a single layer of 5/8-in. exterior grade plywood to dimensions of about 3x5 feet, with sloping roof, windows in front, and

a sliding door at one end for access to the run. The roof was hinged to the front of the house so it could be raised for access to the interior of the house and to provide ventilation on hot days. The houses were not insulated. Wood shavings were used for litter. Instead of cleaning the houses periodically we added more shavings as needed. During the first week we covered the shavings with paper to prevent newly-hatched chicks from eating them. A small electric brooder inside the house provided heat. The runs were 12 ft. long and 3 ft. wide, with sides made from 1x12 pine boards. Hinged doors at one end and in the side gave access to the interior of the run. The other end of the run was attached to the house. The top and the floor consisted of hardware cloth with $\frac{1}{4}$-in. mesh. The floor was elevated a few inches off the ground. With the thought of keeping out insect vectors of leucocytozoan and possibly other diseases, we covered the runs and all other openings with fine-mesh wire screen. The houses were provided with an inner lid covered with the same screen to prevent entry of insects when the roof was raised for ventilation. The sides of the runs were banked with earth to keep flying insects from entering at the bottom. Undoubtedly, this arrangement can be improved upon should it be desirable to keep out terrestrial insects.

Each house and attached run provided sufficient space for upward of 25 grouse to an age of at least 5 weeks. In one setup 28 were raised to 5 weeks of age without the loss of a single chick.

Subsequent years:

The system was modified considerably in 1961 and 1962. We dispensed with the brooder houses; cut runs in half, making them 6 ft. long instead of 12; and closed off both ends. The runs were then moved indoors into laboratory animal rooms and used merely as indoor pens. A small electric brooder was set in each pen. Papers over the hardware cloth floor under the brooder held the heat while the grouse were very young. Advantages of the indoor arrangement were that insects could be kept out more easily, and the rooms, in a sense, had a controlled environment. We didn't have to concern ourselves with fluctuating temperatures and rainstorms, which can result in serious chick mortality.

Rearing chicks:

Day-old chicks were transferred to brooders. The brooders were started at temperatures between 100° and 105° F. as recorded by a thermometer at the level of the chicks. The precise temperature was regulated according to the behavior of the chicks. When cold, they crowded toward the center of the brooder. When the temperature was correct, they remained in loose groups near the edge of the hover.

For the first couple of days we confined the chicks to the immediate vicinity of the brooder with a hardware cloth fence. After they learned their way about, we removed the barrier and allowed them the run of the brooder house or, if indoors, the pen. When using the outdoor runs, we kept the chicks in their houses until they were about a week old, then let them out on the runs for a few hours each day. After a few more days they were given complete freedom to the run, but were shut in the house every night.

I believe that the greatest revelation that came out of our experiences in raising grouse was the simplicity with which the birds could be started and grown on formulated feeds. The feed used was a game-bird starter purchased from either of two manufacturers: A. E. Staley Manufacturing Company, Decatur, Ill., or Ralston Purina Company, St. Louis, Mo. Minimum crude protein levels were 26% and 30%, respectively. Both feeds were pelleted to form small particles or "crumbs," and appeared to be equally satisfactory. I assume there are other commercial sources of game-bird rations that are just as satisfactory.

We found that the chicks learned to eat the feed readily without coaching or inducement with special tidbits. For the first few days we spread the feed on cardboard flats such as are used in egg crates, then in trough-type chicken feeders of appropriate size. We supplemented the diet with limited amounts of chopped lettuce or clover daily, partly because the birds ate it so eagerly, and partly because we wanted to introduce them to some "natural" foods before releasing them in the wild. Possibly, the addition of green plant material to the diet was not necessary for the well-being of the growing birds.

Water was provided continuously in fountain-type waterers of size appropriate to the size of the grouse. Although the feeds generally had antibiotics of some kind in them, we soon resorted to adding oxytetracycline hydrochloride (trade name--Terramycin, Chas. Pfizer and Co., Inc., Brooklyn 6, N. Y.) to the drinking water. A soluble powder was used, containing 25 grams of Terramycin per pound. This was added at the rate of one teaspoonful of the powder to 2 gallons of water. This medicated water was provided throughout the period that the grouse were held in captivity. I am confident that antibiotic and nutritionally adequate feeds are largely responsible for our success in raising grouse.

As the grouse developed and grew feathers, we gradually lowered the brooder temperature to about 80°F. by the end of the fourth week. In 1958, when outdoor runs were used, we held the grouse in the brooder-house-run setup until they were released at ages of 5 and 6 weeks. An innovation was made in 1961 and continued in 1962 in connection with the indoor pens. We employed what we refer to as a "habitat room." This was one of the laboratory animal rooms at the Rose Lake Wildlife Research Center, approximately 10x14 ft., furnished to suggest a natural habitat (Fig. 2). A 2-in. layer of clean pit sand was laid over the floor, and branches and small evergreen trees were placed in the corners and along the walls. Feed and water containers were put on elevated frames covered with hardware cloth. A small brooder provided heat as long as the grouse appeared to need it. Branches bearing ripening fruit were provided when available. The grouse were transferred from pens into the room when they were about 3 weeks old. Mixing grouse a few days different in age did not lead to any serious complications.

We don't know to what extent the habitat room conditioned the grouse for release, but it did provide them with space to test their wings and places to hide in a somewhat normal manner.

Results

Generally, the fertility of eggs was very high. It may be higher than the figures in Table 1 show because some dead embryos in the early stage of development may have been overlooked in handling. I attribute most of the embryo mortality to inadequate care in handling and transporting the eggs. This opinion is supported by 1958 records not shown in Table 1. Of 70 eggs set the same day or the day after they were collected, only 2 had dead embryos. Of 47 eggs held a week or longer before they were set, 27 had dead embryos.

Chick mortality:

The chicks started eating the commercial feed quite readily, and there was no evidence that any died from starvation. Examination of those first to die revealed food in the digestive tract. Mortality resulted from a variety of causes. Some cannabalism occurred in 1958, and several chicks died or had to be killed because of their injuries. We "debeaked" the chicks by cutting off the tip of the upper beak to end the problem. One chick choked to death on a blade of grass. The specific cause of death was not determined for most. In 1958, some young chicks showed an accumulation of feces about the vent, an indication of a digestive disorder or an enteric infection or both. The trouble ended soon after we began adding Terramycin to the drinking water. It is noteworthy that one group of 28 chicks given Terramycin from the first day incurred no mortality to 5 weeks of age, when they were released. In 1961, a number of chicks developed a progressive and severe crippling condition involving the legs and the neck. Those that didn't die were eventually destroyed when it was obvious they would not recover. The condition occurred in specific groups of chicks from certain clutches of eggs and did not appear to be connected with diet or infection. Other groups of chicks kept in the same room and under similar conditions did not develop it. Again, we suspected that faulty care of the embryonated eggs may have been responsible, but this was not proved.

Table 2 shows the number of chicks started and the number of healthy grouse raised. The grouse were released at the following ages. In 1958, 28 were 37 days, and 35 were 44 days. In 1961, 7 were 45 days, 2 were 53 days, 11 were 63 days, and 8 were 65 days. In 1962, 3 were 22 days when we took them for study, and 32 were 44 days when we released them. Seventy-two to 83% of the mortality of chicks occurred in the first week. Rarely did any die after they were 2 weeks old.

The New York Conservation Department raised 11 to 57% of the chicks that hatched from eggs collected from wild nests (Bump in Bump et al. 1946:878). Our success was consistently higher than their best year. It must be remembered, however, that we dealt with small numbers and did not raise our grouse to maturity.

Our chicks grew quite uniformly and feathered out well. Their growth was appreciably more rapid than that reported by New York. We weighed the grouse only once in 1958, shortly before they were released. Twenty-eight grouse 29 days old averaged 164 grams. This was fairly representative for

all 63 grouse raised. We weighed the grouse periodically in 1961 starting when they were about 10 days old. They made steady growth from an average of about 60 grams at 2 weeks to about 400 grams at 9 weeks. We did not weigh any in 1962, but they appeared to make as good growth as those in 1958 and 1961. We did not identify the sex of the grouse; consequently, these figures are averages of both sexes.

Darrow (in Bump et al., 1947:94) reports the average weights of hand-reared grouse at 1-week intervals. Eight males and 7 females averaged (my calculations) about 35 grams at 2 weeks, about 88 grams at 4 weeks, and about 330 grams at 9 weeks. Assuming that our grouse were of nearly equal sex ratio, they were about 25 grams, 76 grams, and 70 grams heavier than the New York grouse at corresponding ages of 2, 4, and 9 weeks.

Literature Cited

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TABLE 1. HATCHING SUCCESS OF RUFFED GROUSE EGGS

Year	Number of eggs set	Number infertile	Number of dead embryos	Number of eggs hatched	Per cent hatched
1958	117	4	29	84	72
1961	50	6	5	39	78
1962	52	0	6	46	88
Totals	219	10	40	169	77

TABLE 2. REARING SUCCESS OF RUFFED GROUSE

Year	Number of grouse started	Number of grouse died	Number of grouse survived	Per cent of grouse survived
1958	81*	18	63	78
1961	39	11	28	72
1962	46	11	35	76
Totals	166	40	126	76

* Table 1 shows 84 grouse hatched. Three were destroyed because they hatched too late to raise.

Figure Legends

Fig. 1. House and screened run used for rearing ruffed grouse in 1958.

Fig. 2. A view of the "habitat room" simulating a natural environment for ruffed grouse. Electric brooder and waterer in foreground. Feeders do not show.