Video Analysis of Hodgson’s Hawk-eagle *Spizaetus nipalensis*
Predation on Live Chicken

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Abstract. It is important to understand the foraging ecology of the Hodgson’s Hawk-eagle *Spizaetus nipalensis* in order to determine the environmental conditions that they depend on for their survival and reproduction. However to date, no detailed analysis of predation has been reported for this species. We lured wild Hodgson’s Hawk-eagles using live chicken *Gallus gallus* var. *domesticus*, and recorded two series of predation from the moment of attack to the end of feeding on 9th and 16th September 2004. The eagles took 182 and 142 minutes from the attack to the end of feeding, respectively. Although we were unable to identify individuals, the manner of predation was different between the sequences and the parts eaten. The eagle recorded on 9th September plucked out the feathers intensively before feeding, while the eagle recorded on 16th divided plucking into several times, not only before but also during feeding. The eagle recorded on 9th fed on the flesh at the rear part of the body and intestines, while the eagle recorded on 16th fed on the flesh at the front part of the body. As points in common between them, the eagles both swooped down to the chicken from inside the forest. The chicken seemed not to be aware of the eagle until 1–2 seconds before the moment of impact. The eagle plucked out the feathers and tore off the flesh with a repetitive front-back motion. The eagle did not seem to try carrying the chicken carcass away after feeding.

Key words: Hodgson’s Hawk-eagle, Luring, Predation, Predatory behavior.

The Hodgson’s Hawk-eagle *Spizaetus nipalensis* is listed as a threatened species in Japan because of environmental disruption and its small population size, which may be declining (Kanai 2002). To determine the environmental conditions that a species depends on for its survival and reproduction, it is important to understand the foraging ecology. Although the states of hunting and prey species of Hodgson’s Hawk-eagle have been described according to the direct observation (Morimoto & Iida 1992), actual predatory behavior of Hodgson’s Hawk-eagle, such as how they handle and feed on prey, has not been reported due to the difficulty of direct observation. Luring is an effective means of observing foraging behavior of wild raptors (Ikeda 1988, Meretsky & Mannan 1999). Luring using living animals may be the most effective means of attracting raptors (Tordoff 1954, Bloom 1987). In the present study, we used live chickens to lure wild Hodgson’s Hawk-eagles and examine details of its actual predatory behavior. And we recorded two series of predation of Hodgson’s Hawk-eagle from the moment of attack to
the end of feeding.

The study was conducted at Nunohiki Mountain Area, Mie Prefecture. The breeding of a pair of Hodgson’s Hawk-eagles in this area was ascertained in March 2004. The first luring trial was conducted on 13th July after the juvenile fledged in the beginning of July. Luring was carried out for 3–4 days continuously each week. The lure used in this study was old male Domestic Chickens Gallus gallus var. domesticus, weight about 2.5–2.9 kg. The chickens had been used for fertilization and were destined to be processed for disposal. Three luring sites were located at three different forest edges between afforestation of Japanese cedar Cryptomeria japonica and cleared area around the homorange of the pair. A chicken was tied to a cedar at the forest edge with a 2 meter long nylon string so that it may move freely around the tree and could always avoid direct sunlight. The chicken was given enough water and food but it also fed on wild herbs. All the chickens were in place before 6:00 on the first day of trials and collected after 18:00 on the last day. The chickens were predated by unknown predator at one site 3 km from the nest on 18th and 25th August, respectively.

On 1st September, we set up an unmanned video recording system consists of CCD camera (WATEC WAT-231S) with a lens (COSMICAR PENTAX TS2V314A) and timelapse video recorder (WELDEX WDV-960H) at the site where the predation had occurred. The CCD camera was fitted 2 m high on the trunk of the cedar 5 m away from the tree that chicken was tied to. The CCD camera was connected to a timelapse video recorder and batteries in the forest 50 m away from the luring site. Video recorded for more than 12 hours from 6:00 or earlier until 18:00 or later. Hodgson’s Hawk-eagle’s predations were recorded on 9th and 16th September.

Record #1: 9th September 2004 (Cloudy, Breeze), Recording interval: 2 frames/sec.

13:49 An eagle swooped and attacked the chicken. The chicken seemed to be aware of the eagle 1–2 seconds before the moment of impact, but the eagle caught the chicken before it moved. Following the impact, the eagle’s momentum carried both birds about 1 m forward. The eagle turned its head as if looking around while it spread its wings over the chicken. The crop of the eagle was not expanded at this stage.

13:54 The eagle dragged the chicken about 50 cm to the base of the nearest cedar. The chicken flapped its wings occasionally.

13:59 The eagle folded its wings and then dismounted the chicken. The chicken did not move at all. The eagle remounted the chicken immediately and turned its head.

14:04 The eagle started plucking out feathers from the chicken.

14:32 The eagle finished plucking and started feeding, it turned its head occasionally.

16:51 The eagle finished feeding. The crop was expanded remarkably. Then the eagle rubbed its beak on the trunk of a cedar nearby.

16:58 The eagle moved about 1 m away from the chicken. It turned its head and rubbed its beak on herbs nearby occasionally.

17:41 The eagle flew away from the site.
The predation occurred on the second day of luring. The eagle took 182 minutes from the attack to the end of feeding (Fig. 1), and stayed for a total of 232 minutes at the site. The epidermis of the chicken was exposed on the left side of the belly to the lower side of the left wing, the right side of the back and the right thigh as most of feathers on these areas were plucked out. Most of the pelvis and the caudal end of the sternum were exposed and the caudal vertebrae and the pygostyle were missing so that an opening with the diameter of about 10 cm was made where the anus had been. In the abdominal cavity, the gizzard and all the following digestive organs were missing but the other digestive organs above the proventriculus and the gonads were left intact. The missing parts, including the flesh around the anus with the caudal vertebrae and the pygostyle, the flesh around the pelvis, the gizzard and all the following digestive organs, weighed about 305 g according to identical parts which were extracted from the chicken predated in record #2 which was kept frozen.

Record #2: 16th September 2004 (Cloudy, Breeze), Recording interval: 20 frames/sec.

11:55 An eagle swooped and attacked the chicken. The chicken seemed to be aware of the eagle 1–2 seconds before the moment of impact but the eagle caught the chicken before it moved. The eagle spread its wings as to press them against the ground in order to keep itself on the chicken which struggled intermittently. The crop of the eagle was not expanded at this stage.

12:02 The eagle folded its wings and dismounted the chicken. The chicken did not move at all. Then the eagle turned its head as if looking around.

12:05 The eagle remounted on the chicken and started plucking out feathers from the chicken.

12:13 The eagle started feeding, and it repeated plucking and feeding alternately.

13:57 The eagle fluttered a few times and dragged the chicken about 30 cm. Then it fed again.
14:17 The eagle finished feeding. The crop was expanded remarkably. The eagle turned its head while standing on the chicken body.

14:23 The eagle flew away from the site.

Predation occurred on the second day of luring. The eagle took 142 minutes from attack to the end of feeding (Fig. 1), and stayed for a total of 148 minutes at the site. The epidermis of the chicken was exposed on most of the back and the upper side of the right wing as most of feathers in these areas were plucked out. The head was cut off at the middle of the neck and was missing. And rest of the cervical vertebrae, the scapula and the humerus of the right wing were exposed. The internal organs were left intact except the trachea and the oesophagus at the neck. The missing parts, including the head with a part of the neck with cervical vertebrae and the flesh around the scapula and the humerus of the right wing, weighed about 350 g according to identical parts which were extracted from the chicken predated in record #1 which was kept frozen.

Although we were unable to identify individual eagles, the manner of predation was different between sequences of activities and the parts fed upon. The eagle in record #1 plucked out the feathers of the chicken intensively and finished plucking before it started feeding. While the eagle in record #2 divided plucking into several times, not only before but also during feeding. The eagle in record #1 fed on the flesh at the rear part of the body and intestines, while the eagle in record #2 fed on the flesh at the front part of the body.

As points in common between the predation events, the eagle swooped down to the chicken from inside the forest, not from the sky above the cleared area. To pluck out feathers, the eagle mounted on the chicken and held it by the legs. The eagle leant forward and held feathers in its beak, then it leant backward with some force. The eagle plucked in some rhythm with repetition of this front-back motion. The eagle did the same to tear off the flesh but the rhythm of front-back motion became irregular. Because the eagle swallowed flesh between tearing each piece, and it often could not tear off a piece in one front-back motion. Although the eagle fed only about 10–14% of the weight of the chicken, the eagle did not seem to try carrying the chicken carcass away after its feeding.

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References

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クマタカのニワトリに対する捕食のビデオ解析

クマタカ *Spizaetus nipalensis* の採餌生態を理解することは、クマタカが生存と繁殖のために依存する環境条件を特定するために重要である。しかし、これまで本種の捕食の詳細な分析が報告されたことはなかった。筆者はニワトリ *Gallus gallus var. domesticus* をとりに用いてクマタカを誘引し、2004年9月9日および16日に攻撃の瞬間から摂食終了までの一連の捕食行動を記録した。クマタカの攻撃から摂食終了までの所要時間はそれぞれ182分と142分だった。個体識別はできなかったが、捕食行動の順序と捕食部位はそれぞれ異なっていた。9日のクマタカは羽毛の除去を摂食前に集中的に行ったが、16日の個体は摂食前だけでなく摂食中にも分割して行った。また捕食部位は、9日の個体はニワトリの後半身と消化器官、16日の個体は前半身だった。クマタカは枝のニワトリに対して枝の内側から降下してニワトリに襲いかかったこと、襲撃の1～2秒前でニワトリがクマタカの存在に気づいた様子は見られなかったこと、クマタカによる羽毛除去と肉の引きちぎりは体の前後運動で行われたこと、クマタカは摂食後ニワトリの死体を持ち去ろうとしなかったことは両日の観察で共通していた。

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