

GROWTH AND PLUMAGE DEVELOPMENT OF KESTREL (*FALCO TINNUNCULUS*  
LINNAEUS, 1758) NESTLINGS IN A NEST IN VOIVODINA (YUGOSLAVIA)

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During 1991. in the area of Melenci (Voivodina, Yugoslavia) growth and plumage development of five Kestrel (*Falco tinnunculus*) nestlings were followed. Particular attention was paid to the influence of meteorological conditions upon daily weight gain. Also, data on the plumage development and diet from hatching to fledging, as well as on behaviour of parents are presented.

Key words: behaviour, development, diet, Kestrel (*Falco tinnunculus*), weight gain, plumage, Voivodina, Yugoslavia.

INTRODUCTION

Kestrel (*Falco tinnunculus*) is one of the most frequently studied diurnal birds of prey in Europe. The growth of nestlings was observed in Scotland (VILLAGE 1990), Holland (CAVÉ 1968), Germany (KOSTRZEWA and KOSTRZEWA 1987, PIECHOCKI 1991), Finland (KORPIMÄKI et al. 1979, KUUSELA and SOLONEN 1984) and Czech Republic (PIKULA et al. 1984). All the authors cited above obtained the growth curve sigmoid in shape.

In the present work we investigate the influence of meteorological conditions upon weight gain of Kestrel nestlings, their development, diet and parent behaviour.

MATERIAL AND METHODS

In locust-tree wood in the vicinity of the village Melenci (18 km in north-west of Zrenjanin, DR44 according to UTM 10 x 10 km grid) a nest of Kestrel easily open to everyday observations was recorded on May 31 of 1991. The clutch was found in an abandoned nest of Rook (*Corvus frugilegus*) 10.2 m high up in the tree. In the period June 18 - July 24, every day between 17:30 and 18:00 h observations and measurements were done for 10-15 minutes to reduce nest disturbing to minimum. Kestrel nestlings were measured by using a Maul scale

(0.5 to 100 g, 1 g to 2000 g). Meanwhile, pellets and chitinous remains of insects were collected out of nest. Remains of reptiles and mammals were after being identified and marked returned to nest to avoid disruption of the course of experiment.

Data on nestling development and behaviour of parents were recorded. Weather conditions during the period June 22 - July 23 of 1991 were obtained from the nearest meteorological station in Zrenjanin.

## RESULTS AND DISCUSSION

On May 31, five eggs (39.30 x 30.15, 38.90 x 30.40, 37.95 x 30.00, 38.85 x 29.50, and 37.80 x 30.00 mm (mean = 38.56 x 30.01 mm) were found in the Kestrel nest. A day or two before hatching the young were calling from egg-shells and fine transversal fissures were visible.

### Weight gain of nestlings

The first two young birds hatched on the very day of June 22. (14 and 13.5 g). The next day one more young emerged from the egg (13.5 g). The fourth and fifth bird did not hatch until June 25. and 26., respectively (14.0 and 11.5 g). The fourth young hatched most probably during the morning since it was completely dry and probably fed. The young who first emerged from the egg was the heaviest, whereas the last was the lightest. Hatching lasted for five days (Fig. 1). Such a prolongation was due to the beginning of incubation which probably took place after the second and the third egg, a characteristic of vole-eating birds of prey (VILLAGE 1990). Weather was hot and stable during hatching, namely mean daily air temperature was over 22 °C (Fig. 2), sunlight lasted for app. 10 h (Fig. 2), mean relative air humidity ranged from 57 to 66 % (Fig. 3), and only a brief fall of rain was recorded (Fig. 3).

First died the young who emerged the last. Its weight increased only for 0.5 g per day and he was already dead on June 28. The first three nestlings developed well. After five days their weight increased to 33.5, 29.5 and 25.5 g, respectively. During the same period, weight increment of the fourth young was 9 g only therefore weighting only 20 g at the sixth measurement. It was dead when nest inspection was performed on July 1. (Fig. 1). Death of the fourth and the fifth nestling was partly due to the delay in hatching and partly to the changes of weather bound and to competition for food with much more stronger "brothers". Between June 28. and July 6., mean daily air temperature ranged from 13 to 20 °C (Fig. 2) and mean relative air humidity (Fig. 3) was even over 90 % (July 2 and 5). Weather was frequently cloudy and rainy almost every day (Fig. 3) and resulted in low hunting success and increasing therefore the competition amongst the young birds. MOSS (1979) obtained similar results in Sparrowhawk (*Accipiter nisus*) where weight gain was depressed significantly on wet days.

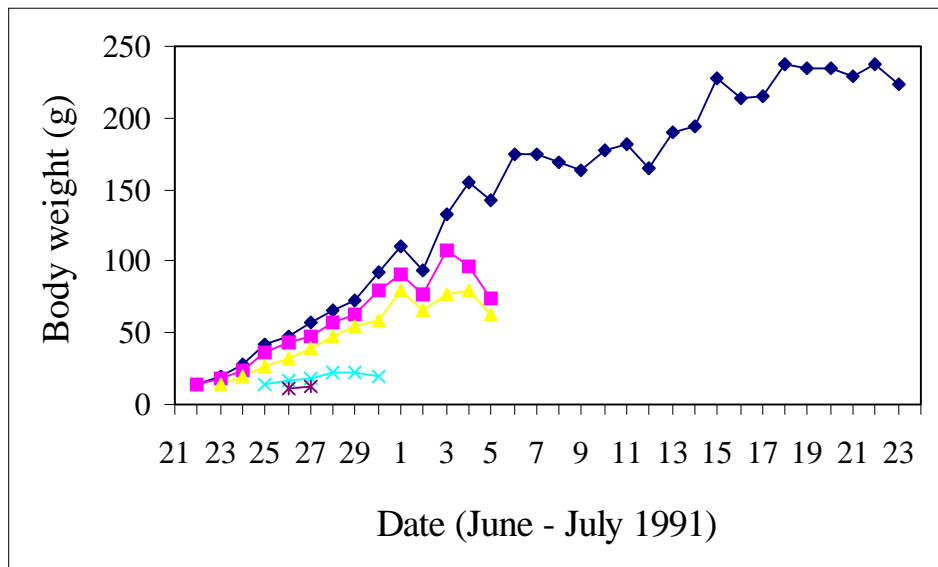


Fig. 1. Daily weight increments of Kestrel nestlings

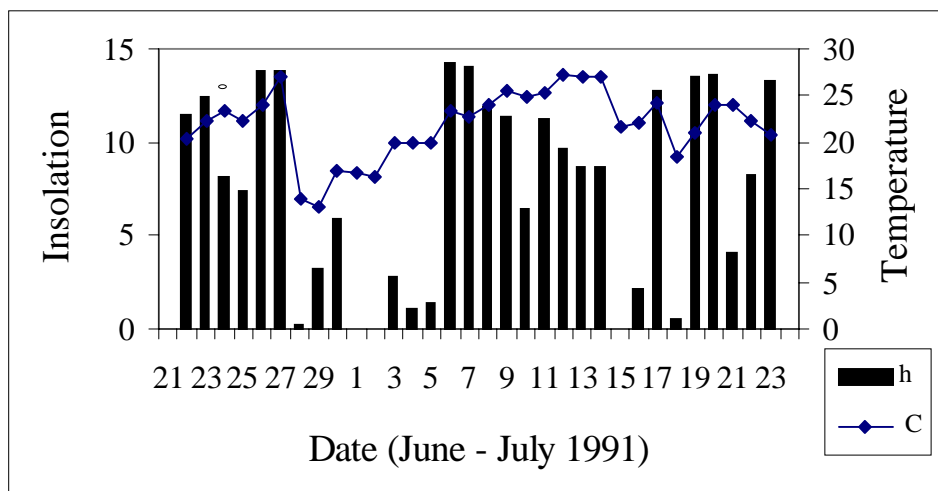


Fig. 2. Daily insolation and mean air temperature

Weight loss exceeding 10 g was recorded in each survived young on July 2. (Fig. 1). That the birds suffered from lack of food may also be confirmed by the fact that on July 1 and 2 no prey remains were found in nest. Between July 2. and 3., a sudden increase in weight of all the young other than the third one and than weight loss in the second and stagnation of the third young were recorded.

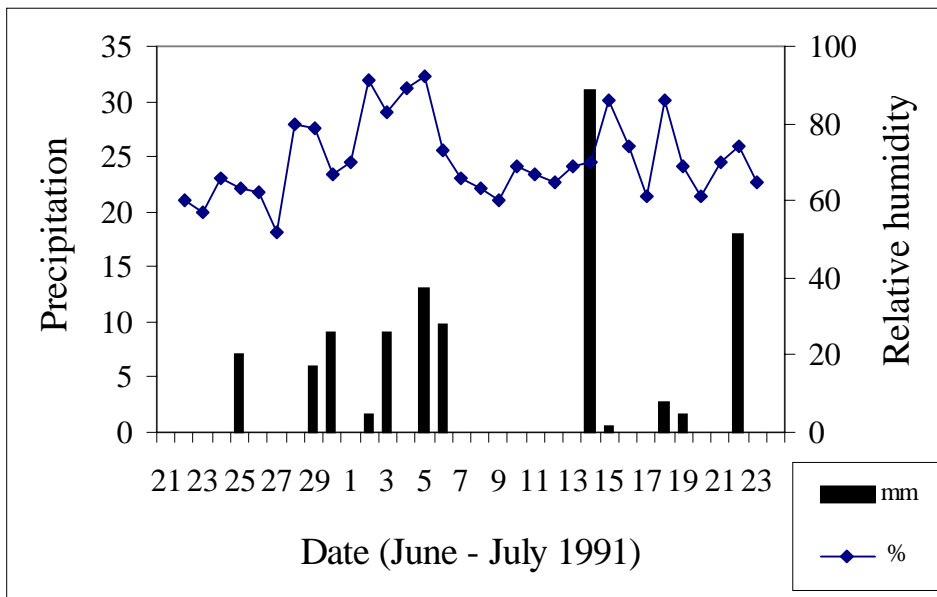


Fig. 3. Daily precipitation and mean relative humidity

Between July 4. and 5., again weight loss of 10-20 g was recorded in all the three birds, whereas on July 6, the second and the third young were dead. Further study of the weight gain curve of the remaining young (Fig. 1) showed weight stagnation between July 6. and 7., than again weight loss on July 9. being due exclusively to food shortage. Although weather was fine (Fig. 2.), no prey remains were found in nest on July 7, 8, and 9.

Since in the same locust-tree wood also nest of two pairs of Kestrels and the presence of a colony of Red-Footed Falcon (*Falco vespertinus*) were observed, not only bad weather conditions, but also, reduction of food sources resulted in an increased competition for food among adults. On July 15., namely 23 days after hatching the young weighted 227.0 g (adult weight) while on July 18. its weight was 238 g. It stayed 32 days in nest prior to fledging on July 23. when it weighted 224.0 g (Fig. 1).

### **Plumage**

On the day of hatching all the birds had closed eyes and they lied on insufficiently developed legs and abdomen. Body was covered with fine white down. After a day in all the nestlings (except the last hatched) eyes were open. The first three nestlings stood on their legs

when manipulated for weighing, whereas the fourth young, at the same age, was helpless. In the first three young birds, primary feathers started to appear on eight and ninth day while the rectrices app. on the twelfth day. Although dead, the second and third young already had primary feathers which erupted from quills and egg tooth was almost lost. In a young survived, small wounds like ruptures on the throat were observed on the seventeenth day. Feathers were formed on cheeks and crown on the twenty-first day. Prior to fledging the young bird had completely developed feathers with remnants of down-feathers on the crown, back, and belly. Our observations regarding the physical development are in agreement with findings of KOSTRZEWA and KOSTRZEWA (1987), PIECHOCKI (1991) and VILLAGE (1991).

### **Food**

The prey remains in nest were the only indicator of nestling diet analysed:

June 22. - July 2., 10 pellets of hairs, wings of grasshoppers (*Tettigonia viridissima*), and parts of egg-shell were collected.

July 3.-13., only a pellet of hairs was found with the remains of 3 Common Voles (*Microtus arvalis*), 1 Sand Lizard (*Lacerta agilis*), 9 *Tettigonia viridissima*, 1 *Decticus verrucivorus* and 1 *Pentodon idiota*.

July 14.-24., (on July 24. a young left nest and was found sitting on a branch app. 1.5 m far from nest) mammals dominated in prey remains, namely 11 pellets of hairs was found, remains of 13 Common Voles (mostly decapitated), 1 Common Pine Vole (*Pitymys subterraneus*), then remains of 2 Sand Lizards, and finally only 1 *Phytodecta formicata*.

No prey remains were found on June 23., 24., and 29. as well as on July 1, 2, 7, 8, and 9.

### **Remarks on the behaviour of parents**

In the period June 18. - 26., female was observed sitting in the nest each time during our visits. On June 26. she fed nestlings standing at the edge of the nest. Since then, she was found several times at the edge of the nest or on a branch where the nest was built even to July 8. Male was observed for the first time on July 9, on the top of the same tree. Since July 15, he was regularly present on a lateral branch of a locust-tree app. 50 m far from the nest. During our observations female took off the nest or the nearest branch, than she proceeded upwards in a series of large circles above a small woods or she landed to perch on a branch app. 20 m far from the nest waiting for us to leave.

On the same tree, 2 m above the Kestrel nest, an empty nest was found, and also app. 3 m from it a nest of Rook. Young Rooks occupied the empty nest on July 1. At approximate distances 7 and 15 m two nests of Red-Footed Falcon with nestlings were present, as well as a nest of Lesser Grey Shrike (*Lanius minor*) app. 20 m far. Our presence obviously have not

disturbed parent birds. However, Red-Footed Falcons were observed circling above trees in groups of 2-3 or 5-6 birds making much more smaller circles than Kestrel when we visited the nest. Some of them dived in a gliding flight making semicircle in the immediate vicinity of the intruder and emitting quick "ki-ki-ki-ki" calls.

#### CONCLUSION

In a nest of Kestrel with five eggs, young hatched in the period June 22-26. Four nestlings died from starvation after 2, 6, 13 and 14 days respectively, due to differences in age and development and competition. The first hatched bird developed successfully and fledged after 32 days. Unfavourable weather limited the results of parent hunting affecting daily increment weight of nestlings. Prolongation of unfavourable conditions reduced prey sources and possibly increased interspecific competition in the restricted hunting area. In the first ten days young were fed mostly with meat of small mammals while in next ten days insects, and later voles and lizards were offered. Parent birds were always around, female in the immediate vicinity of the nest while the male most frequently 20-50 m far. During nest inspection these birds showed no signs of being agitated.

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