Parturition dates for Eurasian beaver Castor fiber: when should spring hunting cease?

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Parturition dates for Eurasian beaver *Castor fiber*: when should spring hunting cease?

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Hunting Eurasian beaver *Castor fiber* with firearms during late spring is the dominating harvest form in Norway but may violate the Norwegian wildlife management principle of not hunting during the breeding season. In particular, shooting mothers from newborn young would be considered cruel. As beaver cannot be sexed or effectively aged under spring hunting conditions, selective harvesting at this time is impossible. We examined 32 pregnant beaver shot between 27 March and 12 May 1997-1999 in southeast Norway. No post-parturition females were shot, despite a 15-day extension of the normal hunting season to 15 May. A regression model predicted a mean birth date for the population of 13 May, with most births between 7 and 18 May and few before 30 April. Post-parturition females were not shot primarily because most births occur after hunting has ceased. Additionally, reduced activity of mothers outside the lodge may limit exposure to hunters. Terminating hunting a month earlier would eliminate the shooting of pregnant females with well-developed foetuses. However, as few watersheds in Norway are ice-free before mid-April, and most beaver are presently bagged in late April, this would likely result in a major reduction in beaver harvests and an increase in damage complaints.

Key words: beaver, Castor fiber, foetus weight, hunting, hunting ethics, Norway, parturition date

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The establishment of harvest seasons for wildlife usually involves an array of considerations of biological, socio-economic, legal, cultural and ethical nature. In the northern hemisphere, most hunting and trapping occur during autumn and winter when populations are at peak density and pelt quality is best. Harvesting at other times of the year, however, may be desirable to e.g. control damage, maintain indigenous hunting traditions (Bustnes & Nilsen 1995), or when autumn and winter hunting is impractical. When hunting seasons encompass the reproductive period, questions may arise as to the ethics of killing breeding individuals (Frafjord 1991, Solheim 1991).

In Norway, the Eurasian beaver *Castor fiber* was nearly extirpated during the last half of the 19th century (Rosell & Parker 1995, Nolet & Rosell 1998). Starting in 1845, beaver were either totally protected or trapping and hunting with firearms closely regulated. In 1932 trapping of beaver became illegal, though fall hunting with firearms was still allowed. In 1972, with populations rapidly increasing, trapping was again allowed and the trapping/hunting season extended through April. Presently, beaver can be trapped and hunted from 1 October to 30 April in southeast Norway and to 10 May further north (Rosell & Parker 1995). Spring beaver hunting is also allowed through 10 May in

southern Sweden, 15 May further north, and 30 April in Finland.

Hunting beaver with firearms is presently the dominating harvest form in all three countries (H. Parker, pers. obs., G. Hartman & S. Härkönen, pers. comm.) in contrast to North America (Novak 1987) and northern Asia (Y. Gorshkov & M. M. Balodis, pers. comm.) where beaver hunting with firearms is generally illegal and trapping the norm. Spring hunting seems to have gradually developed as the dominating harvest form in Norway primarily in response to low fur prices, decreasing public acceptance of trapping and the increasing popularity of recreational hunting of beaver with firearms. As beaver are particularly active at dawn and dusk during spring break-up, hunting with rifles is especially effective then.

Hunting beaver in spring, however, may violate an important Norwegian wildlife management principle as stipulated in the Wildlife Act, namely the ban on hunting of all wildlife during the breeding season (Solheim 1991). However, the law does not specifically define the limits of the breeding season, thereby leaving this question open for interpretation. In southern Norway, beaver parturition is thought to begin in late April or early May (Valeur 1990, Rosell & Pedersen 1999), though precise data are lacking and difficult to obtain. As the hunting season in this area ends on 30 April, females that have just given birth could be shot, leaving the kits to die. This would inarguably be in violation of the law, and by most considered cruel. As beaver cannot be sexed, and are difficult to age under hunting conditions in spring, selective harvesting by sex and age is impossible. Thus hunters frequently shoot female beaver with well-developed foetuses in spring, an experience many find offensive.

In this study we investigate the incidence of post-parturition females in the spring beaver bag, examine the stage of foetus development in pregnant beaver shot and predict the expected parturition date for beaver in southeast Norway. Finally, we evaluate the present closing dates of the hunting season in light of this new information and the intention of the Wildlife Act to protect wildlife populations from being hunted during the breeding season.

Material and methods

The study was conducted in Bø Township (59º25'N, 09º03'E), in the county of Telemark, southeast Norway. Beaver (N = 137) were shot with rifles by local hunters during the normal hunting season of 1 October - 30 April and during a 15-day extension lasting from 1 to 15 May during 1997-1999. The extended 15-day hunt allowed us to collect a sample of females at a later stage of pregnancy than normally would have been possible. Permission to hunt beaver beyond the normal hunting season was granted by the Norwegian Directorate for Nature Management and the affected landowners.

Animals were autopsied and 32 were pregnant females with at least one normally developing foetus. Six of these were shot between 1 and 12 May. Fresh foetuses were weighed to the nearest gram (g) and the mean foetus weight for each pregnant female calculated. As data on the birth weight of wild, newborn Eurasian beaver is unknown from the literature, we used Zurowski's (1977) data on birth weights of individual captive Eurasian beaver (mean ± SD: 523 ± 109 g, range: 260-770, N = 72) and Wilsson's (1971) reported weights of 400-700 g for seven newborn Eurasian beaver as a guideline for constructing a model for predicting birth dates. Based on the above information, we chose a mean weight at birth for litter mates (hereafter litter mean weight) of 525 g and a range of 400-650 g as estimates for the population we investigated.

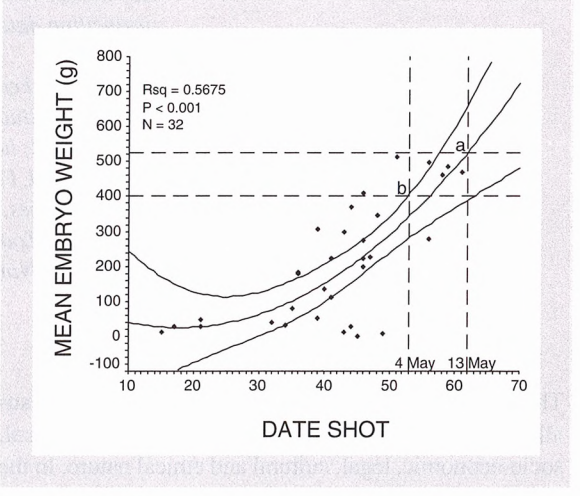

Figure 1. Regression of the mean foetus weight for pregnant beaver on the day they were shot with 95% C. I. The regression equation was: $y = 105.52 - 9.13x + 0.26x^2$. Day 49 corresponds to 30 April, the day beaver hunting ends in southern Norway. The intersection of the line representing the predicted litter mean weight of 525 g with the regression line at point 'a' indicates a predicted mean birth date of 13 May. The intersection of the line representing the lowest expected litter mean weight of 400 g and the lower limit of the 95% C. I. at point 'b' indicates a predicted birth date of 4 May, indicating that few births will occur before this date. Though 32 females are represented in the figure, only 31 points are shown, as two of the points coincide on day 36.

We used curvilinear regression analysis to investigate the relationship between mean foetus weight and the date on which females were shot. Statistical analysis was performed using SPSS for Windows (Spss Inc. 1999).

Results

No post-parturition females were shot during the 3-year study, despite a 15-day extension of the hunting season. The regression of mean embryo weight for pregnant females on the date females were shot is shown in Figure 1. Introducing the litter mean weight at birth of 525 g into the figure indicates a predicted mean birth date of 13 May. Corresponding dates for the expected range of 400 and 650 g for litter mean birth weights are 7 and 18 May, indicating that the majority of births will occur between these dates. The intersection of the lowest expected litter mean weight of 400 g and the lower limit of the 95% C. I. for the regression line corresponds to a birth date of 4 May. All of these estimates of birth dates fall after the closing of the regular hunting season on 30 April. Thus few births can be expected to occur before this date. Additionally, all six pregnant females shot between 1 and 12 May had mean foetus weights below the predicted litter mean birth weight of 525 g.

The distribution of beaver shot during the regular hunting season of 1 October - 30 April was strongly skewed towards the season end with 65% being bagged during the last two weeks of the open season (Fig. 2).

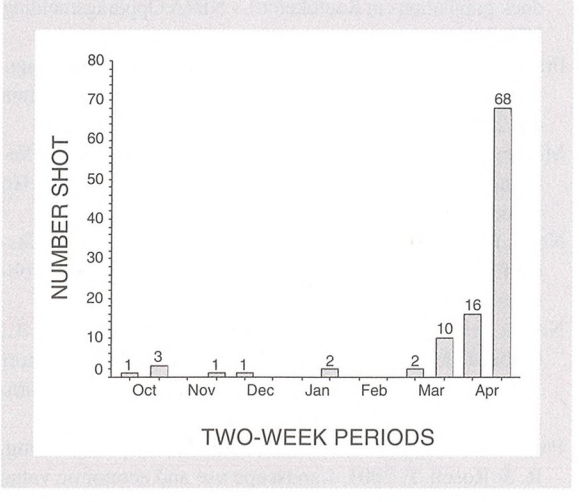

Figure 2. The bi-weekly distribution of beaver (N = 104) shot during the regular hunting season of 1 October - 30 April 1997-1999 in Bø Township, in the county of Telemark, Norway.

Discussion

No post-parturition females were shot during the 3-year study, despite a 15-day extension of the hunting season. Results from the model presented here suggest that this is primarily because most births occur following termination of the hunting season on 30 April. Mörner (1990) investigated 65 adult female Eurasian beaver shot in neighbouring southern Sweden during five years between 10 April and 10 May, of which 33 were pregnant. No post-parturition females were shot during that study either, and few mean foetus weights were greater than 400 g (see Figure 2 in Mörner(1990)). Thus the combined evidence suggests that most births in populations from both southern Norway and southern Sweden occur after 30 April, and indeed after 10 May.

Presumably, births will occasionally occur prior to 30 April. Young beaver are confined to the lodge during the first 4-5 weeks of life at which time they receive intensive care from both the mother and other colony members (Patenaude 1983). Mothers can be quite reclusive during this period (F. Rosell, pers. obs.). Care of the young then may reduce the time mothers spend outside the lodge, or in other ways alter their behaviour, thereby reducing their probability of being shot.

Results from our study suggest that most beaver are shot in southern Norway during the last two weeks of the hunting season, indicating the importance of the season closure for the total harvest. This same pattern seems to be prevalent both in Sweden (Mörner 1990) and Finland (S. Härkönen, pers. comm.). Two key questions are why spring beaver hunting has developed, and whether it is really necessary for effective beaver management. Hunting beaver in the autumn before freeze-up is possible, though much less effective than in spring. During autumn at these latitudes (≥58ºN) nights are long and most beaver activity occurs after dark, making shooting under natural light conditions impossible (H. Parker, pers. obs.). In addition, most hunters are occupied pursuing other more favoured game during autumn. Following the winter freeze-up, beaver rarely expose themselves. With the advance of spring, day length increases, ice begins to melt and animals become more active during dawn and dusk, increasingly exposing themselves to hunters. In addition, few other game species can be legally hunted during spring.

Fall and winter trapping of beaver, which is the prevalent harvest form throughout North America and Asia where pelt quality is paramount, is practised by few in Norway. This appears to be mainly due to low

interest of the European fur market for Eurasian beaver pelts and a decline in the popularity of fur trapping in general in Europe. In contrast, the recreational hunting of beaver with rifles appears to be increasing in Norway, with meat being the prime material object of the hunt (Parker, Haugen, Kristensen, Myrum, Kolsing & Rosell 2001). As the beaver population expands, so does the demand for damage control among property and forest owners. The cumulative result has been the increased popularity of spring hunting.

If spring hunting were terminated on e.g. 15 March, or even 1 April (day 20 in Fig. 1), few female beaver shot would be visibly pregnant and the emotional aspects of the problem would be essentially solved. How would this affect beaver hunting with firearms and the potential for population management? Aside from watersheds along the immediate coast of southern Norway and regulated rivers that rarely freeze during winter, few lakes and streams in the area begin to thaw before 1 April. We therefore predict that shortening the hunting season by e.g. one month, for all practical purposes, would eliminate the possibility for spring beaver hunting in most parts of southern Norway. As beaver trapping is of minimal interest, the harvest would be light and damage complaints would increase, along with the need for nuisance animal control.

Another argument against spring hunting is the detrimental effect harvesting pregnant females can have on production, particularly since pregnant females seem to be more susceptible to being shot in spring than other sex and age classes (H. Parker & F. Rosell, unpubl. data). Alternatively, where reduced production is a management goal, spring hunting could be advantageous. As parturition times seem to increase with increasing latitude (Mörner 1990), and possibly increasing altitude, managers will need to gather information on parturition dates for specific populations or regions in order to enable the local adjustment of hunting season termination dates. Presently, data from our study and from Mörner (1990) suggest that the termination of spring hunting in southern Norway could, in fact, be extended to 10 May with little danger of shooting post-parturition females. This would be particularly advantageous for those townships with considerable area of beaver habitat at higher altitudes, where spring break-up often occurs after 1 May.

The results from our study and Mörner's (1990) in southern Sweden predict that females with newborn young will rarely be felled before 30 April in southern Norway. Therefore the National Wildlife Act's intention of protecting female beaver from being shot from their newborn young is seemingly being upheld. We are left, however, with the negative reaction from hunters and non-hunters alike to the felling of females in the advanced stages of gestation. As long as beaver are hunted after mid-April this may be an unavoidable problem.

Conclusions

Post-parturition female beaver will rarely be shot in southeast Norway prior to the closing of hunting on 30 April. This is primarily because most births occur after this date, though reduced activity of mothers outside the lodge may reduce exposure to hunters. Should the spring hunting season be shortened to protect females in late pregnancy, we predict a major reduction in beaver harvests and an increase in damage complaints.

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