

# Fat ladies and lean girls: morphology influences survival and reproduction of released pen-reared pheasants (*Phasianus colchicus*)

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## The problem

Pheasant management is often based on the release of pen-reared birds. Survival and reproductive output of released birds is lower than that of wild birds. Rearing expenses subtract significant resources for the management of wild populations. Usually birds are either released in winter (February-March) as adults or in summer (June-July) as young. In Mediterranean habitats it is unclear which type of release is more successful and cost-effective.

## Methods

Female pheasants (N= 59) were equipped with radio-transmitters.

	Pen 1	Pen 2	Total
<b>Young (65 days old)</b>	12 (of 150 pheasants released)	23 (of 180 pheasants released)	35
<b>Adults (1.5 years old)</b>	12 (of 40 f + 10 m released)	12 (of 40 f + 10 m released)	24
<b>Total</b>	24	35	59

Twice weekly we:

- located all the radioed birds
- recovered the remains of dead birds
- located eventual nests; nest desertion was avoided not approaching the nest until incubation was started for at least 4 days.

## Study area

Two release pens 2.8 km away, each surrounded by a protected area (120 ha and 70 ha).

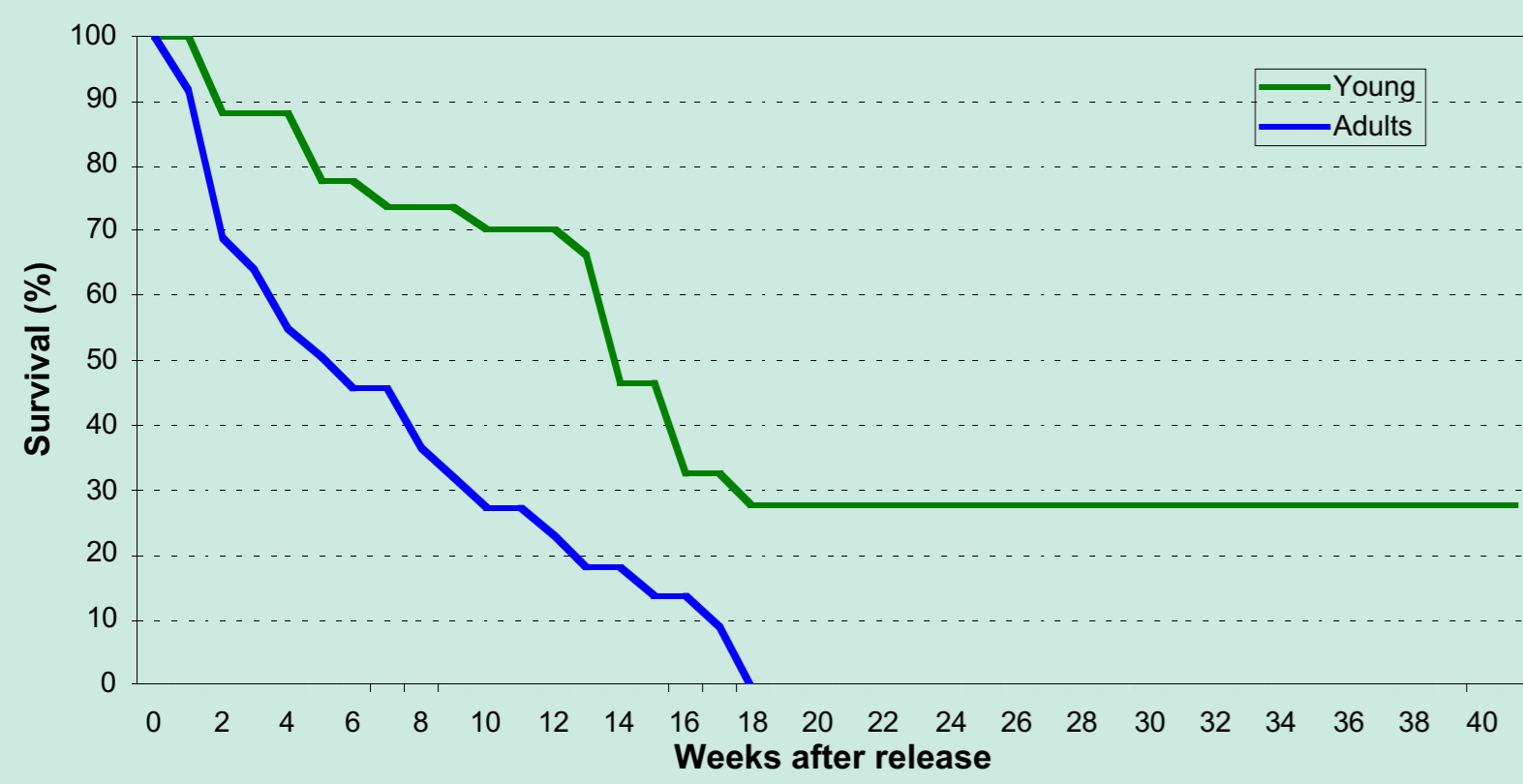


## Survival

Mortality was very high in the first period after release, then stabilized. At the end of first month after release, young survived significantly better than adults (88% vs 55%; Kaplan-Mayer,  $P < 0.05$ ). Later, the difference increased (28% vs 0% at 18 weeks; Kaplan-Mayer,  $P < 0.01$ ). Survival of adults fell to 0 at 18 weeks after release.

Most of the pheasants found dead showed signs of consumption by mammals, suggesting heavy predation, as in similar studies (e.g. Leif, 1994; Mayot et al., 1993; Papeschi & Petrini, 1993; Schmitz & Clark, 1999). Missing birds are probably poached.

In the area 2 we recorded a mass predation on young birds (6 of which radioed) the night following the release. This was facilitated by an exceptional storm. This mortality has been excluded from following analyses.



## Cause of death

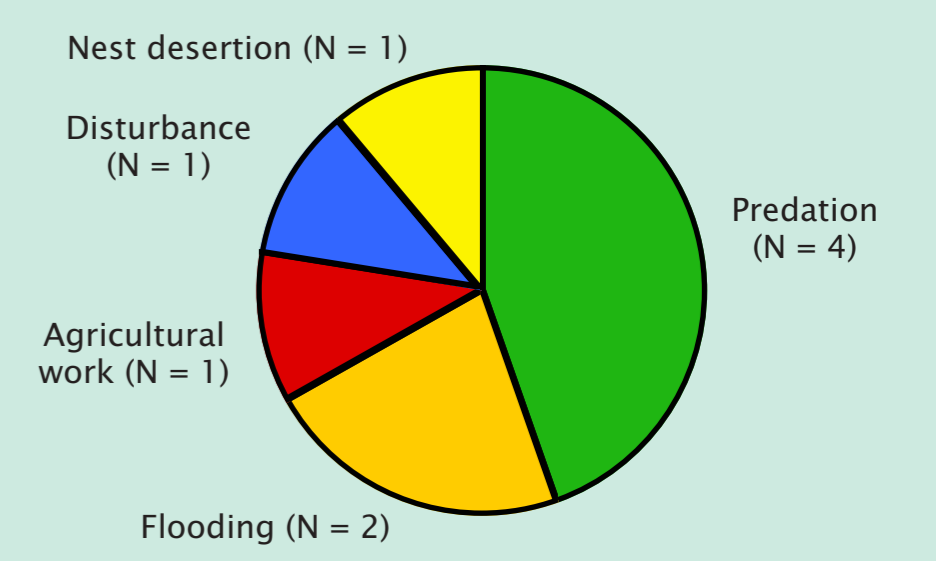


## Reproduction

Only 32% of adult females survived until May (start of hatching). All of them deposited eggs (average =  $12.8 \pm 2.3$ ) in a nest and (with one exception) incubated them. In other areas incubation was more problematic: in South Dakota only 21% of pen-reared and 68% of wild females incubated (Leif, 1994).

In spite of this, reproductive output was nil because of total nest of chick loss.

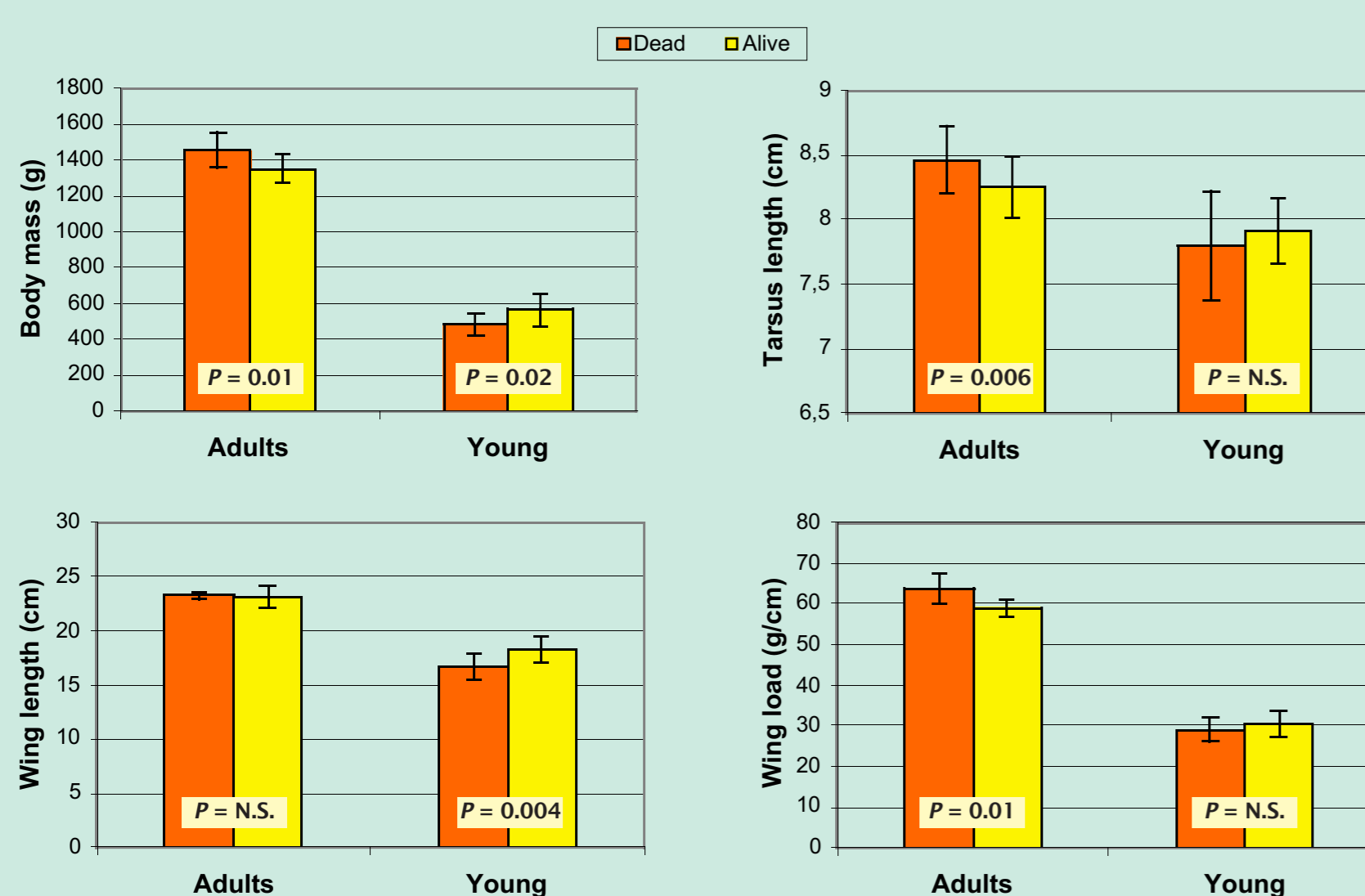
## Nests loss



## Influence of morphology

Among *adults*, dead birds were heavier and with a higher wing load (thus presumably fatter). Higher mortality for males with higher wing load has already been shown (Papeschi & Petrini, 1993).

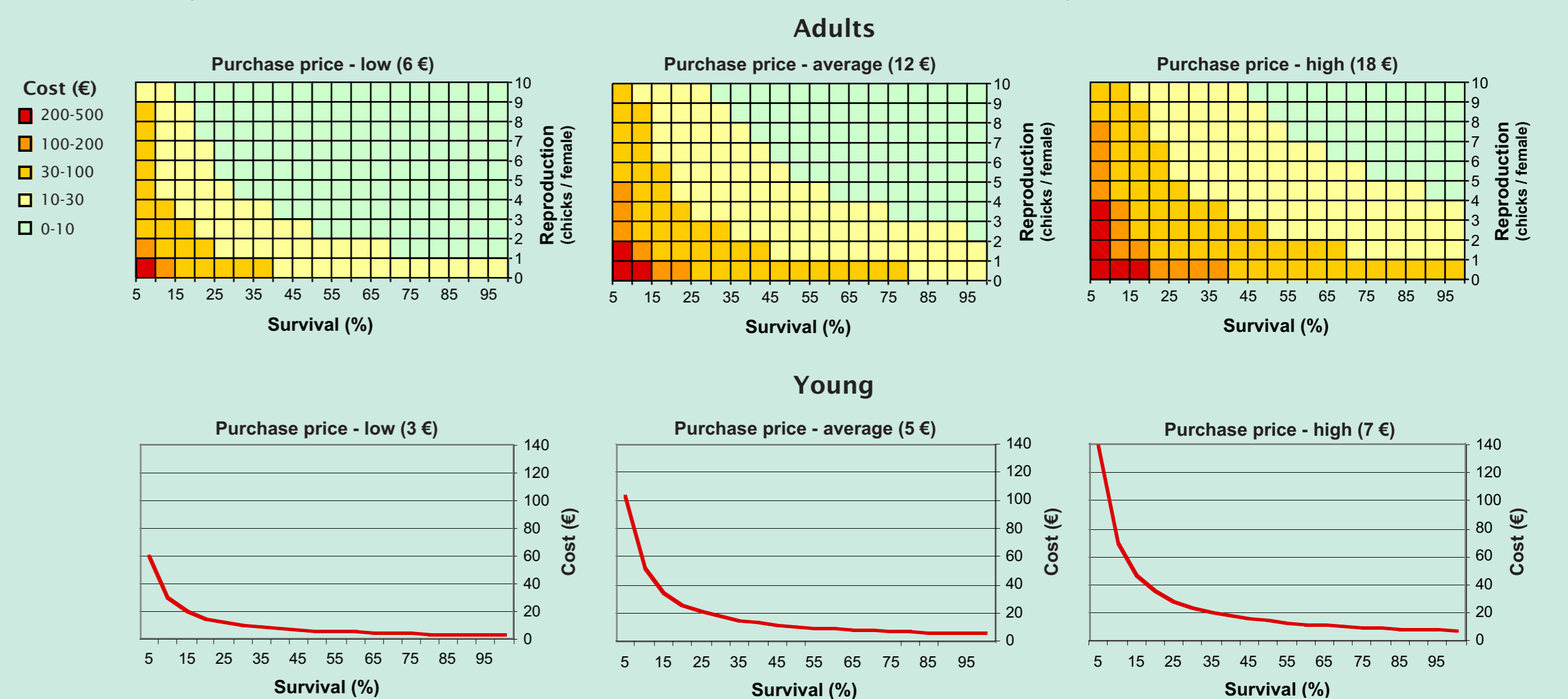
Among *young* birds, dead birds were lighter and with shorter wings. This is reminiscent of our results for grey partridges (see poster).



This suggested different risk factors among the two age classes. For adult birds, high body mass may cause slow take-off, and therefore higher predation; for young pheasants, the limiting factor for fast take-off may be insufficient breast muscle development, reflected in low body mass.

## Economic evaluation

We analysed the economic aspects of pheasant reintroductions, using real prices (6-18 € for adults and 3-7 € for young) and simulating survival and reproduction. "Cost" is referred to cost per pheasant alive in the field the 1st of September considering mortality and, for adults, reproduction. To estimate reproduction we considered sex ratio = 1♂/4♀♀, the same used in our study.



Given the percentages of survival usually recorded (adults: 0-40%; young: 30-90%; Havet Biadi, 1990; Leif, 1994; Petrini, 1995; Robertson, 1998) only at unrealistically high levels of reproductive success, cost of an adult alive in the field compares favorably with that of a young.

## Acknowledgements

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## Conclusions

- Adult females, pen-raised throughout the winter with abundant feed, suffer from high predation; fat deposits seem to increase predation risks.
- Young females, still in growth phase, escape predation most easily when more developed.
- The release of reared adult pheasants at the end of winter did not allow the establishment of a natural population. It does not either increase hunting opportunities, because all birds died before the start of hunting season.
- Our data suggest better prospects for young pheasants. They survived in higher numbers and offered substantial hunting opportunities. Their contribution to reproduction the spring following the release is unknown because of short life of radio batteries.
- From our simulations the release of young pheasants is also more cost-effective than that of adults. Purchase price is the least important factor for both age classes (particularly so for adults), whereas survival and (for adults) reproduction had a disproportionate effect on the final cost of having a bird alive in the field. This suggests that investing in birds of higher quality is a cost-effective strategy, and may be the only one to allow the establishment of natural populations.