Growth during the first ten months of age in cage-bred wild rabbits

González-Redondo P.

Departamento de Ciencias Agroforestales. ETSIA. Universidad de Sevilla, Spain

Corresponding Author: Pedro González-Redondo, Departamento de Ciencias Agroforestales. ETSIA. Universidad de Sevilla. Ctra. de Utrera, km 1, 41013 Sevilla, Spain - Tel. +34 954 486454 - Fax: +34 954 486436 - Email: pedro@us.es

ABSTRACT: The aim of this study was to evaluate growth of cage-bred wild rabbits of the *Oryctolagus cuniculus algirus* subspecies under game farming conditions. Eighteen wild rabbits born and reared in cages, fed with a commercial feed, were weighed from birth to 10 months of age. No differences (P>0.05) were found between sexes in live weight during this period. A Gompertz equation fitted for growth was Y = 893.803 * [0.098 exp (0.496 exp (X/30))], where X: age (days), Y: live weight (g). Growth of cage-bred wild rabbits of the *Oryctolagus cuniculus algirus* differed to that described in the literature for rabbits in the wild, with captive rabbits reaching lower weight at maturity.

Key words: Wild rabbit, Growth, Game farming, Captivity.

INTRODUCTION – Captive rearing of wild rabbits has developed in Spain and neighboring countries after the rabbit hemorrhagic outbreak in 1988. Due to the recent development of its game farming, reliable information on rearing and management of the wild rabbit under strict captivity is scarce (González-Redondo, 2001). Particularly, growth of cage-bred wild rabbits of the *Oryctolagus cuniculus algirus* subspecies fed with commercial feed has not been characterized yet. Thus, the aim of this research was to study the growth during the first 10 month of age of wild rabbits born and reared in cages under farming conditions, and to fit a growth curve.

MATERIALS AND METHODS – The trial was carried out using 18 wild rabbits (n=7 males, n=11 females) of the *O. c. algirus* subspecies, born and bred in cages from parents originating from Southern Iberian Peninsula (Spain). The rabbits were fed *ad libitum* with a balanced commercial standard feed for domestic rabbits (89.8% DM, 16.5% CP, 16.5 CF, 3.5% EE, 9.7% ash, 2,340 kcal DE/kg DM). The kits were weaned at 30 days of age and subsequently housed in cages measuring 38×51 cm at the base, by litters until 86 days of age and individually thereafter. The animals were individually weighed at ages shown in Table 1. Student's t tests were calculated to analyze differences in live weight between sexes. A growth curve was fitted (non-linear regression by least squares method, n> 600 iterations) according to the Gompertz equation as proposed by Soriguer (1980) for wild rabbits, in the wild, of the same subspecies studied in the present research: Y = A * [B exp (C exp (X/30))], where X: age (days); Y: live weight (g); A: asymptote or maximum live weight reached by the rabbits; and B and C: coefficients that define growth and that are constants characteristics of the curve. To fit the growth curve, B=0.03 and C=0.6 were taken from Soriguer (1980), and A=1,225 g was the maximum weight reached by a rabbit in this trial. The analyses were carried out with SPSS 15.0 (SPSS Inc., Chicago, USA).

RESULTS AND CONCLUSIONS – Table 1 shows live weight of the wild rabbits from birth to 10 months of age. No differences (P>0.05) were found between sexes, excepting at five months of age (P<0.05). This confirms the absence of sexual dimorphism for this biometric trait in wild rabbits without reproductive activity (Myers and Poole, 1962). Our data, however, do not agree with higher weight at birth for males found by Davies and Myhill (1980) in wild rabbits.

Table 1 – Live weight (g, mean±SE) of cage-bred wild rabbits from birth to 10 months of age

Age (days)	Males (n=7)	Females (n=11)	Both sexes (n=18)	P
1	37.7±2.16	38.6±1.65	38.3±1.28	0.736
10	117.6±8.60	112.9±6.75	114.7±5.18	0.674
21	214.6±14.30	208.5±10.11	210.8±8.08	0.724
30	312.1±17.47	312.3±10.89	312.2±9.19	0.995
37	365.9±22.24	359.6±13.70	362.0±11.66	0.801
44	407.3±25.37	394.7±14.47	399.6±12.88	0.649
51	457.9±26.70	437.5±15.57	445.4±13.81	0.488
58	513.0±29.74	485.7±17.85	496.0±15.69	0.413
65	561.7±31.30	523.6±17.50	538.4±16.28	0.265
72	605.6±33.25	561.6±19.33	578.7±17.70	0.236
79	650.1±34.47	598.0±19.90	618.3±18.53	0.177
86	689.4±39.17	632.6±22.26	654.7±20.83	0.191
116	796.1±39.04	706.7±25.54	741.5±23.57	0.062
146	845.4±37.11[a]	747.9±25.58[b]	785.8±23.61	0.040
176	877.0±40.80	799.5±24.57	829.6±23.00	0.101
206	903.7±51.65	835.6±28.87	862.1±27.03	0.229
236	935.7±56.32	863.6±35.73	891.7±31.12	0.271
266	958.6±57.00	875.9±33.30	908.1±30.66	0.197
296	999.6±64.05	892.8±30.91	934.3±32.65	0.113

P<0.05: a,b

Weight at birth was below the range found in wild rabbits in the wild in the UK (40-45 g; Brambell, 1942), and was similar to that of wild rabbits in Australia (36-37 g; Myers, 1958) and to that described in Spanish game farms (35-45 g; Contera, 1994). Preweaning growth of cage-bred wild rabbits was normal. In fact, average daily gain in this period (9.1 g/day) was higher than in Australian wild rabbits in the wild (Myers, 1958), and kits weight at 21 days of age was also slightly higher than that described for rabbits in the wild (180 g, Myers, 1958; 200 g Southern, 1940 and Dunnet, 1956). From 21 days to two months of age, cage-bred wild rabbits in this trial grew more slowly than Australian rabbits kept in enclosures. In fact, Australian rabbits weight between 600 and 1,000 g at two months of age (Myers, 1958; Mykytowycz, 1959), while the animals in this trial weighed below 500 g. This is explained because Australian rabbits belong to *O. c. cuniculus* subspecies, while the animals in the present trial belong to *O. c. algirus* subspecies, whose body size is lower (Soriguer, 1981).

The growth curve fitted, for both sexes grouped, was (Table 2; R^2=0.904 and P<0.05):
Y = 893.803 * [0.098 exp (0.496 exp (X/30))], where X: age (days), Y: live weight (g).

Table 2 – Parameters of the Gompertz equation fit for growth of cage-bred wild rabbits from birth to 10 months of age, in this trial and in rabbits in the wild (Soriguer, 1980)

Parameter	Rabbits in the wild (Soriguer, 1980)	Cage-bred wild rabbits			
		Estimated value	Asymptotic standard error	Confidence interval 95%	
				Lower limit	Upper limit
A	1,125	893.803	9.180	875.751	911.856
B	0.03	0.098	0.010	0.078	0.118
C	0.60	0.496	0.015	0.467	0.526

The growth curve fitted for cage-bred wild rabbits in this study differed in the values of the parameters A, B and C ($P<0.05$) from the curve proposed for rabbits of the same subspecies in the wild by Soriguer (1980). In fact, the values of the three parameters proposed by Soriguer (1980) do not match within the respective confidence intervals of the values calculated in this study. Thus, the growth curve of the cage-bred wild rabbits has a different geometric shape (characterized by C parameter) than the growth curve of rabbits in the wild. Growth rate (characterized by B parameter) also differed between both curves, with cage-bred rabbits of this trial matching the weight of rabbits in the wild at five months of age, and thereafter reducing its growth rate. Moreover, asymptotic weight of cage-bred wild rabbits in this study (894 g) was clearly lower than that proposed by Soriguer (1980) for animals in the wild (1,125 g).
In conclusion, growth of cage-bred wild rabbits of the *O. c. algirus* subspecies is characterized by the absence of sexual dimorphism, and is modified in relation to that of animals in the wild, with captive rabbits reaching lower weight at maturity.

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