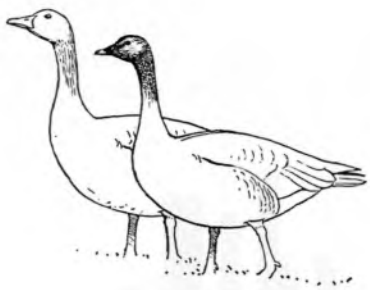
THE RELATION OF AGE AND SEX TO THE WEIGHTS OF PINK-FOOTED AND GREY LAG GEESE

By William H. Elder [1]



To the thousands of sportsmen who pursue wildfowl the world over and to the many persons who keep them in aviaries, as well as the legion of ornithologists and amateurs who enjoy watching them against the sky, the question, ' How big is a wild goose ? ' is most familiar. But answers usually are too general or based on too small a sample to be conclusive. Furthermore it has been shown that weights of Canada geese (Elder, 1946) are different in the two sexes and vary according to age and season. Having become intimately acquainted with the plumage and external anatomical features of the Canada goose while ringing several thousand in Illinois, I was delighted with the opportunity of accompanying Director Scott in order to make similar observations on British geese.

The goose-netting operations of the Wildfowl Trust provided me with the opportunity of handling more than 1600 geese in the autumn of 1953. My part in this operation was to determine the sex and age of each bird as it was ringed. This was accomplished by examining the tip of the tail feathers for the presence of the tiny notches which distinguish birds of the year from older birds (Hochbaum, 1942). The sex of each bird was then determined by eversion of the vent—a technique previously worked out (Elder, 1946)—to detect the presence or absence of the copulatory organ, characteristic of males in both ducks and geese. Thus the birds could be classified into the four age-sex groups shown in Figures 1 and 2.

Weights were taken to the nearest ounce by means of a spring scale from which a bag was suspended to hold the goose. These weights were later converted to pounds and tenths of pounds to facilitate statistical analysis.

The Pink-footed Goose *Anser brachyrhynchus*

The frequency distribution of the weights of 636 birds of this species is shown in Figure 1. A progressive decline in weights from adult males to juvenile females is apparent. It also seems clear that adults are heavier than juveniles of the same sex and that males are heavier than females of the same age group. An analysis of the weights was made in order to discover whether these apparent differences were statistically significant.

Table I gives the sample size, means and standard deviations [2] for each age

[1] This study was conducted while the author was on sabbatical leave from the University of Missouri and was aided by financial assistance from the Wildlife Management Institute, Washington, D.C., and the American Museum of Natural History, New York.

[2] Standard deviations were found directly by taking half the difference between the 84th and 16th percentile weights. The significance of the means was determined by finding their critical ratios—the ratio of the difference of the means to the standard error of the means. Any ratio exceeding 3 (chances 1 : 370) is considered significant.

and sex group. The differences between the weights of adult and juvenile males, between adult and juvenile females and between adult males and females were all found significant. Very likely a larger sample would reveal that the difference between juvenile males and females was also significant.

Table II is a summary of information taken from the literature dealing with weights of Pink-footed geese. Only two authors state the size of their sample and Haigh's data are included in Witherby, whose average of six pounds is considerably more than the over-all average of the 5·6 pounds found in my study. That such comparisons have little value is clear from the present study : when both the sex ratio and age composition of the sample so greatly affect

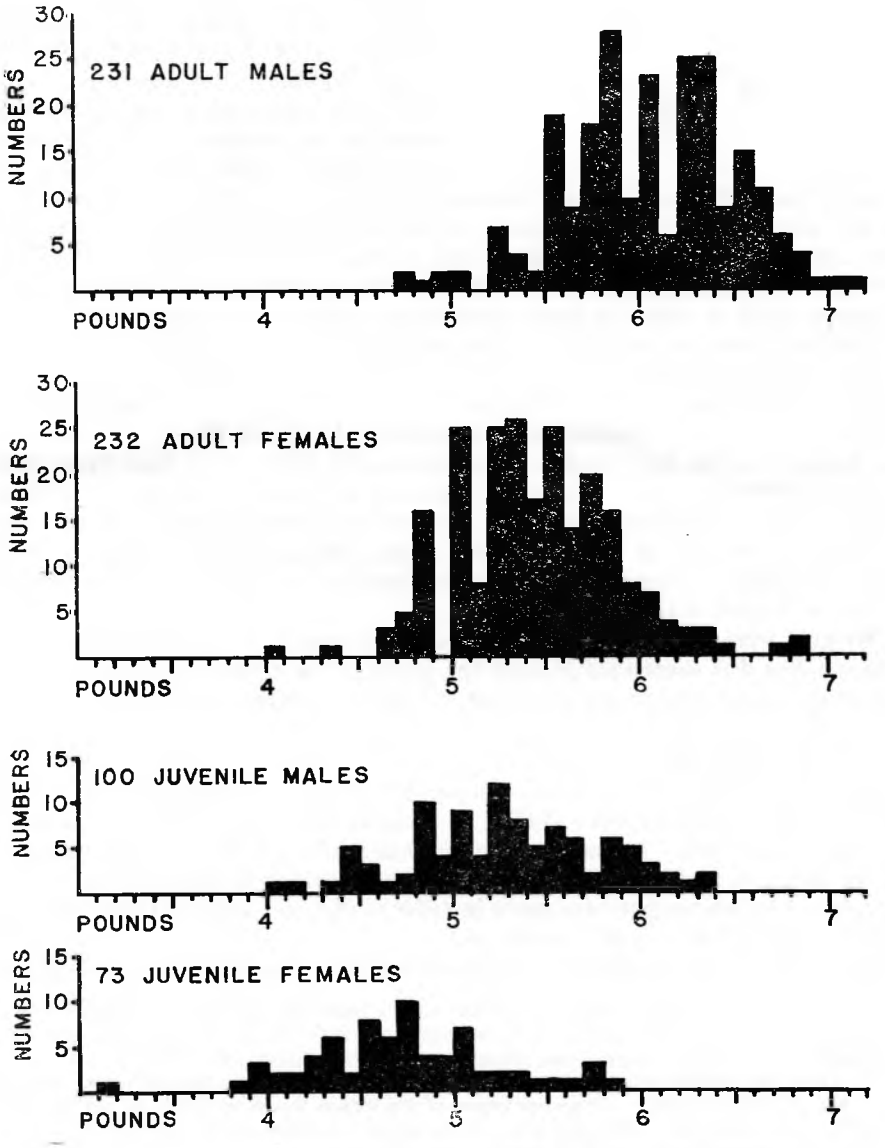


Fig. 1.—*Frequency Distribution of the Weights of* 636 *Pink-footed Geese*

the mean, sound comparisons from year to year or season to season can only be made when the weights are classified by age and sex groups.

The table of weights given by Haigh (1935) lumps birds of all sexes and ages together but it shows so well the distribution and high proportion of heavy birds that it is presented here in graphic form as Figure 2.

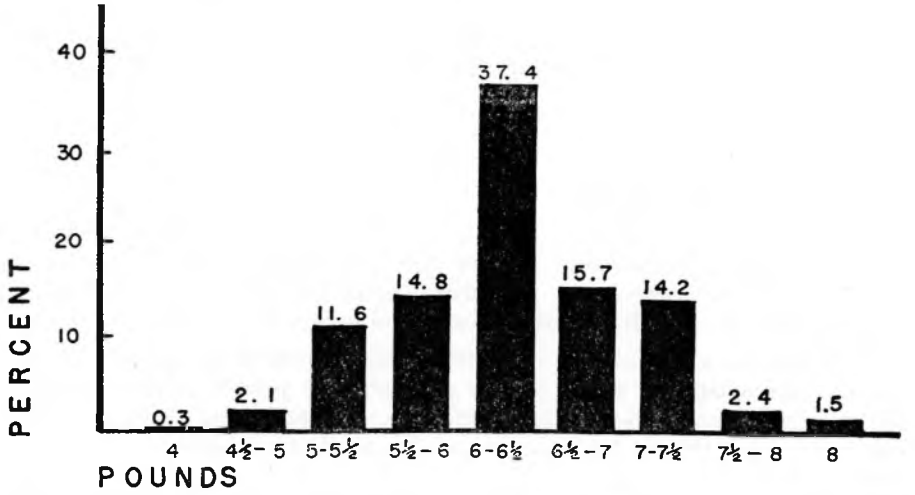


Fig. 2.—Weights of 337 Pink-footed Geese of all Ages and Sexes as Given by Haigh, 1935

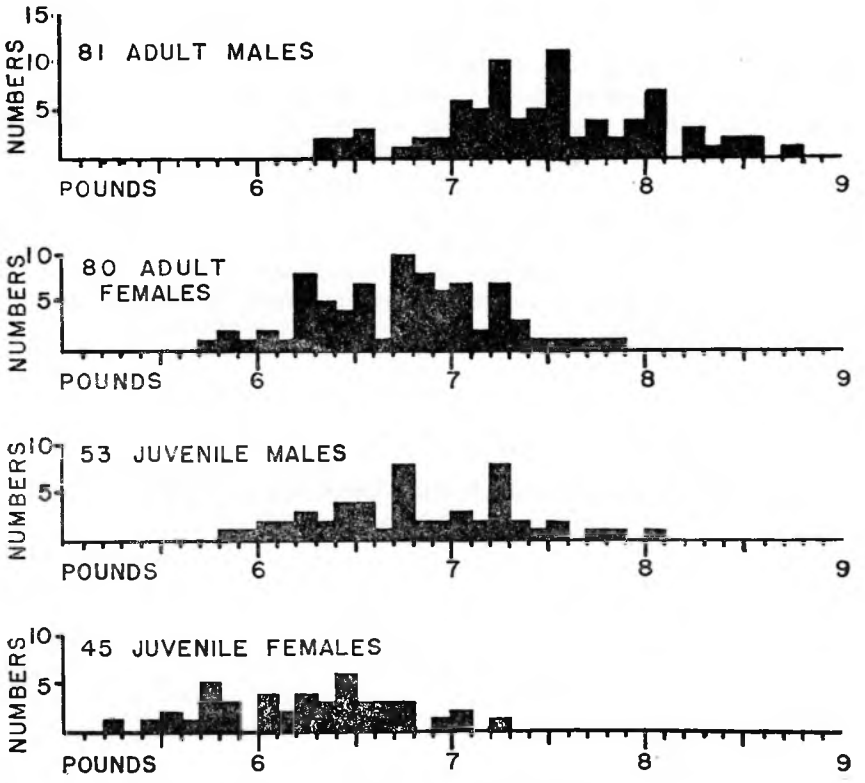


Fig. 3.—Frequency Distribution of the Weights of 259 Grey Lag Geese

It is surprising that in a sample of the size I handled the maximum weight of any bird was only 7 pounds 3 ounces. At least half of the authors listed in Table II cite maximum weights of 7½ pounds or more. Because 1953 was a mild winter it seems doubtful that the weather could have caused the birds to be light. Perhaps it was due to the early season sample for it has been shown in many species of birds that maximum weights are attained in spring just prior to migration. It will be noted that the heaviest weights reported in Table II are from authors writing during the years that spring shooting was still practised in Britain.

Grey Lag Goose *Anser anser*

The distribution of the weights of 259 geese of this species is shown in Figure 3. The same general relationship between the four sex-age groups noted among the Pinkfeet is also seen here. The adults exceed the juveniles of the same sex and the males apparently exceed the females in weight at any age.

Table III gives the sample size, means and standard deviations for each group. The small size of the sample precludes the possibility of establishing the statistical significance of these differences except in one case : the adult males do exceed the adult females at the 95% level of confidence.

Weights of Greylags as found in the literature are shown in Table IV. The means given all exceed that found for the birds in the present study. That this was only seven pounds was perhaps influenced by the large proportion of young and by the early season sample as previously mentioned. Russian birds (Alpheraky, 1905) and Spanish birds (Bolam, 1912) include much heavier geese, probably from other races of the Greylag. That some of these heavy birds also winter in Britain is shown by the records of Popham (1899), Saunders (1899), Payne-Gallwey (1896) and others. That none of the birds we examined exceeded 8¾ pounds suggests that the flocks wintering on the Solway and Loch Leven, whence came our sample, may be of the lighter races. At least until the recoveries from the ringing prove otherwise we may assume that British wintering flocks are each somewhat discrete and that birds of different races tend to be separated by their choice of wintering areas. Continued ringing of birds accurately identified as to age and sex is badly needed.

TABLE I

Body Weights (in pounds) of 636 Pink-footed Geese Trapped in Britain 11 October-23 November 1953

Age	Males			Females		
	Number	Mean Weight	Standard Deviation	Number	Mean Weight	Standard Deviation
Juvenile ..	100	5·33	0·513	73	4·79	0·469
Adult.. ..	231	6·09	0·469	232	5·49	0·438

TABLE II

Weights of Pink-footed Geese as given in the Literature

Authority	Sample Size	Average Weight Pounds : Ounces	Weight Range Pounds : Ounces
Alpheraky, 1905, 89	—	—	6 : 8 to 7 : 4 (Ad. ♂♂)
Bolam, 1912, 350	—	—	7 : 0, Max.
Gladstone, 1922, 204	—	—	6 : 0 to 7 : 8
Haigh, 1935	337	—	4 : 0 to 8 : +
Harvie-Brown, 1906	—	—	4 : 8 to 8 : 8
Heinroth, 1928, 173	—	6 : 0	—
Macpherson, 1892, 239	—	—	4 : 14 to 7 : 8
Niethammer, 1938, 406	—	—	4 : 12 to 5 : 9
Ogilvie-Grant, 1912	—	—	5 : 8 to 7 : 0
Payne-Gallwey, 1896, 69	—	—	6 : 8 to 7 : 4
Robinson, 1903	—	—	6 : 12 to 7 : 12 (Ad. ♂♂) 6 : 0 to 7 : 4 (Ad. ♀♀)
Saunders, 1899, 404	—	—	5 : 8 to 7 : 0
Witherby, *et. al.*, 1939, 200 ..	692	6 : 0	4 : 0 to 8 : 0

TABLE III

Body Weights (in pounds) of 259 Grey Lag Geese Trapped in Britain 14–23 November, 1953

Age	Males			Females		
	Number	Mean Weight	Standard Deviation	Number	Mean Weight	Standard Deviation
Juvenile ..	53	6·88	0·500	45	6·29	0·475
Adult.. ..	81	7·52	0·444	80	6·80	0·421

TABLE IV

Weights of Grey Lag Geese as given in the Literature

Authority	Sample Size	Average Weight Pounds : Ounces	Weight Range Pounds : Ounces
Alpheraky, 1905, 28 ..	—	—	5 : 12 to 12 : 0
Beveridge, 1918	300	7 : 6½ (7 : 13, Nov.–Feb.)	Only 3 exceeded 10 : 0
Bolam, 1912, 344	—	8 : 0	12 : 0, Max.
(Chapman, Spain, Dec.)	27	—	10 : 8
Coburn, 1903	—	—	8 : 0 (Ad. ♂)
Gladstone, 1922, 204 ..	—	7 : 0 to 9 : 0	—
Heinroth, 1928, 154 ..	—	—	6 : 11 to 8 : 13 (German birds)
Naumann, 1905, 285 ..	—	—	9 : 0 to 12 : 0 (16 : 0 when very fat)
Neithammer, 1938, 391 ..	—	—	7 : 8 (♀♀), Max.
Ogilvie, 1920, 177	50	7 : 8	8 : 10, Max. (Av. Wt. declined 1 : 8 after 10 days frost)

TABLE IV—*continued*

Authority	Sample Size	Average Weight Pounds : Ounces	Weight Range Pounds : Ounces
Ogilvie-Grant, 1912, 309 ..	—	—	8 : 0 to 10 : 0 and heavier
Payne-Gallwey, 1896, 64 ..	—	—	9 : 0 to 11 : 0 (Juv., 7 : 8 to 8 : 0)
Peel, 1901, 74	—	—	10 : 0, Max.
Saunders, 1899, 398 ..	—	—	8 : 0 to 10 : 0
Stevenson, 1864	—	—	7 : 8 (Ad. ♂)
Thompson, 1851, 45 ..	—	—	11 : 12 (Ad. ♂, primaries pulled)
Witherby, *et al.*, 1939, 185	83	7 : 8	5 : 8 to 9 : 12

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