Studies on the long-finned pilot whale in the Faroes Islands, 1976-86

Dorete Bloch

Abstract

From 1978 to 1986, 10 schools of the long-finned pilot whale, *Globicephala melas*, were examined, as well as occasional sampling of individual animals dating back to 1976.

Albino or discoloured pilot whales have been observed occasionally over the years.

10 separate schools, containing a combined total of 931 whales, were sexed. The school size ranged from 24 to 316 animals. The sex ratio was on average 58.2 ± 1.8% females (range 45.2-64.4%). Looking at long term patterns, it would appear that male frequency increases with a greater abundance of pilot whales around the Faroes. The average school contained 48.2% immatures, 38.9% mature females and only 12.9% mature males.

One school in particular, containing 73 animals, was examined for fighting marks. About half of the immature whales, 57% of mature females, and all mature males had fighting marks. The hypothesis of the present paper is that tooth scars derive from intraspecific fighting.

The average length of 541 whales was 405.6 ± 4.2 cm, with 391.7 ± 4.3 cm as mean length for females (range: 180-490 cm), and 425.4 ± 7.9 cm as mean length for males (range: 186-625 cm).

Age determination of 139 whales showed that females live longer (max. 32 yrs) than males (max. 27 yrs). The average age was 11.4 ± 0.7 years, for females 12.5 ± 0.9 years, and 10.0 ± 0.9 for males.

The weight of 7 whole whales was measured before partition and calculated to be about 100 kg at birth and 2.5 tonnes for big males. The utilization of the whales for human consumption was as high as 54%, higher than for fish (47%).

The skinn value was examined for 944 whales, and an average whale was found to measure 6.1 ± 0.1 skinn, while females on average were 5.6 ± 0.1 skinn and males 6.8 ± 0.2 skinn.

The highest incidence of ovarian corpora in a female was 15, not all of which resulted in a calf. On average mature females ovulated 5.5 ± 0.3 corpora.

The diet of the schools examined consisted primarily of squid, with the favorite prey being *Todarodes sagitatus*, although some other squid species and fish also occur.

In summary, then, *the average long-finned*

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Table 1. The number of different samples taken from long-finned pilot whales off the Faroe Islands in the decade 1976 to 1986.

Date	Locality	Whales in pod	Whales examined	Skinn	Sex	Length cm	Weight kg	Teeth	Stomach	Para-sites	Gonads	Reprod status	Foetus	Contami-nation	Fighting marks	Cephal. marks	Blubber thickness	Pelvis bones
12.09.76	Bøur	229	2					2			2							
12.08.77	Hvannasund	110	11	11	11			11										
28.08.78	Hvalba	339	316	339	316													
20.10.78	Tórshavn	75	73	73	73	73		73					1					
21.10.78	Miðvágur	321	3	3	3	3		3										
02.11.78	Tórshavn	49	48	48	48	48		48			24		7					
09.08.79	Húsavík	208	4	1	1	1		1										
28.08.79	Tórshavn	121	121	121	121	121	7	37			72		10	*				
03.09.80	Tórshavn	78	7	7	7			7										
03.09.80	Húsavík	449	10		10			10										
28.07.82	Vestamanna	163	3	3	3			3										
06.08.82	Norðskála	78	3	3	3			3										
07.09.83	Tórshavn	95	95	95	95	95												
17.07.84	Vestmanna	73	73	73	73										73	73		
21.08.84	Fuglafjørður	54	54	54	54	54		54	21	*	54	54	5	*			*	22
04.09.84	Klaksvík	24	24	24	24	24		10	24	*	24	24	3	*			*	
18.09.84	Tórshavn	31	31	31	31	31			21	*	31	31	6	*			*	
29.01.85	Klaksvík	95	95	95	95	95		7	8	*	8	81	2	*				
Totally		2592	973	981	968	545	7	269	74	*	215	190	34	*	73	73	*	22

pilot whale from this study can be said to be 11.5 years old and 405 cm long, has a value of 6 skinn, weighs about 800 kg, 430 kg of which is made up of meat and blubber for human consumption.

Introduction

In Faroese pilot whaling, entire schools of the long-finned pilot whale, *Globicephala melas* (Traill), are caught in a drive fishery. When the schools contain both sexes and all states of reproduction, this provides an excellent opportunity to examine the internal school structure as well as a wide range of biological parameters.

Through the centuries, long-finned pilot whales caught in the Faroes have been described several times, but a thorough, comprehensive investigation of their biology had, until recently, never been carried out. From 1976, pilot whales began to be examined for the purpose of biological study. In 1978, 3 pods were examined by Moore, Hutton and Cole (1978, 1979), and from 1978 to 1986, 10 schools were examined as well as occasional individual animals (Table 1), Three of the pods from 1984 were incorporated into the investigations of G. Desportes (1985).

Additional information came from J. S. Joensen, Director of the Fisheries Laboratory in Tórshavn, and is incorporated into this material; namely the catches in Hvalba on August 28, 1978 and September 7, 1983 (Table 1), and data on 34 foetuses from 1958-1964 (Table 3).

Schools are usually monospecific, but several times a year mixed schools occur. The other species sometimes found with pilot whales through the plady period were the bottlenose dolphin *(Tursiops truncatus)*, and the Atlantic white-sided dolphin *(Lagenorhynchus acutus)*, (Bloch, Desportes, Mouritsen, Skaaning and Stefansson, in print, a). Mixed schools are not an uncommon phenomenon, and other species, such as the killer whale *(Orcinus orca)*, have also been observed together with pilot whales (Bloch and Lockyer, 1988).

From July 1986 to July 1988 all schools caught were examined comprehensively by an international team (Desportes, 1990). It was therefore important to assess the material already sampled, partly as background for the new investigations, and partly to find out which new items it was necessary to include in the 1986-1988 investigations in order to gain a complete picture of the biology pattern of the pilot whale in the Faroes.

Material and methods

The grind message. When a decision was made to drive a school of pilot whales, the local sheriff telephoned the message to the museum. In most cases the killing was finished by the time of arrival at the location, and the whales had been moved to a quay for assessment and partition. A thorough description of the various stages of the Faroese pilot whale drive is treated by Bloch, Desportes, Hoydal and Jean (1990a).

Sampling time. The team was made up of only a few people (usually from one to four), so this limited the amount of possible samples which could be taken on any one occasion.

Depending on the size of the school, there were usually between 2 and 8 hours available for biological sampling, and this had to stop when the partition began. Whales are taken for food, so to avoid spoiling the meat, the

Fig. 1. Offical whale number. Whale no. 108 of a pod of pilot whales in Faroe Islands.

carcasses were only opened in the traditional way: with transventral cuts, 30-40 cm apart. Stomachs were sampled after partition was completed.

Skinn value. According to official assessment methods, every whale was marked on the head with a consecutive number in Arabic numerals (Fig. 1). The value of each whale (Fig. 2), a measurement known as a »*skinn*«, was marked on the flipper in Roman numerals (Bloch and Zachariassen, 1989). The skinn assessment of 981 whales from 16 schools was recorded, includin 10 entire schools (see Table 1).

The skinn is an ancient measurement which takes into account the length of the whale from eye to anus as well as its general condition. Since 1832, a regressive divided rod has been used (Dalsgaard, 1957). A medium-fat whale with a length of 314.5 cm (= 5 Danish alen = 10 feet) from eye to anus, corresponding to a total body length of about 575 cm, has, by definition, the value of 20 skinn or 1 guilder. But a personal assessment is also part of the valuation process, so that wounded, lean, pregnant or suckling whales will receive a lower skinn value than fatter whales, regardless of their length. Skinn statistics, recorded by local

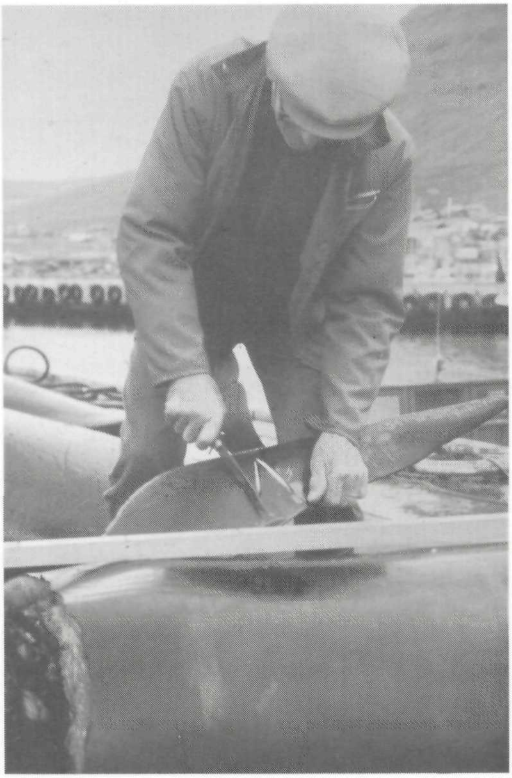


Fig. 2. Pilot whales in Faroe Islands assessed in official skinn value. The whale shown is 7 skinn in value.

sheriffs, exist as far back as 1584, and are unbroken from 1709 (Bjørk 1963, III: 184). A comparison of this traditional assessment with biological parameters is discussed by Bloch and Zachariassen (1989).

Sex, length, and official number. In conjunction with the examination of the schools, the official whale number was recorded together with the skinn value, so it was possible to combine traditional statistics with biological parameters. The sex was noted, and the body length was measured to the nearest cm as a straight line parallel to the backbone from the snout to the notch in the tail, according to the standard (Norris, 1961). In all, the length of 545 whales was measured, and the sex of 970 recorded. (For details see Table 1).

External marks. Features such as wounds, fighting marks, lice, and cephalopod marks were noted. Fighting marks were difficult to see, unless the animal was recently killed and still wet. External marks were noted in particular from a catch of 73 animals in Vestmanna on July 17, 1984.

Teeth. The teeth were used for age determination by reading the dentine layers at least twice, according to the theory that a growth layer group (GLG) is deposited in the dentine as well as the cementum every year, according to Sergeant (1959; 1962), Perrin and Myrick (1980) and verified by Lockyer (in print, a).

The easiest way to collect the teeth was to cut off most of the mandible using a chainsaw. In three schools – Tórshavn, November 2, 1978 and August 28, 1979, and Fuglafjørður, August 21, 1984 – teeth were taken from all whales, while only some were taken from other schools. In total, teeth from 269 whales were sampled (see Table 1). Later the jaws were boiled in water for a few minutes to loosen the teeth in their sockets, and 2 good teeth were imbedded in liquid plastic and cut in 1 mm slices lengthwise using a diamond saw. The reading of the sections was performed with 12 times power magnification. The slices were placed in glycerine making them easy to read at once, due to the opalizing effect of the glycerine on the surface of the slices.

From Fuglafjørður, August 21, 1984, some readings were also made with the help of V. de Buffrenil, Paris, while some from Klaksvík, on January 29, 1985 were read with the help of C. Lockyer, Cambridge.

Later studies have found that by reading only the dentine, cemental layers in the teeth of animals older than about 13 GLG's tend to outnumber those seen in the dentine (Lockyer, Desportes and Waters, 1987; Bloch, Lockyer and Zachariassen, in print, c), and the age will thus be underestimated. A reexamination has been made of the material from New Foundland by reading both the dentine and the cementum (Kasuya, Sergeant and Tanaka, 1988b). This has changed the original readings made by Sergeant (1962), such that the older group of whales now has a higher estimated age. An attempt was also made to reexamine the teeth included in the present study following the technique described by Kasuya and Matsui (1984), using both dentine and cementum. Two teeth, which had been stored in glycerine, were cleaned in hot tap water and 70% alcohol. One was then etched in 5% formic acid for 2-4 hours, and the second one was decalcified, cut and stained with haematoxyline. The former process of boiling and storing in glycerine made the stained tooth totally opaque and impossible to read again. And the etched tooth was not easier to read than the original half.

Because of this, age determination of whales older than about 10-15 years must be taken with cautious. It must be remembered that each year class (n) is placed at year n on the curves, but contains all animals from age n to age n+1, so each year class ought, in fact, to be placed in (n+0.5) year (Fig. 5).

Oddly, some of the schools turned out to be much more difficult to read than others; the school from Fuglafjørður, August 21, 1984 was one of them. This phenomenon is also observed in the material sampled from 1986 to 1988 (Lockyer, in print, a; Bloch *et al*, in print, c).

Reproduction. For reproductive study, both ovaries and at least 1 of the testes were sampled. In all, gonads were taken from 215 whales from 7 different schools (see Table 1).

The testes were weighed, fresh, in the laboratory, and a slide of testes and epididymis was fixed in 10% buffered formalin for histological examination, which was performed by G. Desportes (unpublished data).

The ovaries were fixed in 10% buffered formalin. After weighing, they were sliced at a thickness of 1 mm in order to find and count corpora and follicles. The corpora lutei were measured in 3 directions at right angles to each other to the nearest mm and weighed to the nearest 0.1 g. Corpora albicantia and larger follicles were measured in 2 directions at right angles to each other. The ovaries have been read by C. Lockyer and G. Desportes in collaboration with the author.

Contamination. To determine levels of contamination by Hg, Se and persistent organochlorines, samples of about 10 g each were taken of muscle, kidney, liver and blubber. Examinations of heavy metals were carried out by the Hygienic Institute, Tórshavn (Julshamn, Andersen, Ringdal and Mørkøre, 1987; 1988; Julshamn, Andersen, Svendsen, Ringdal and Egholm, 1989), while a few persistent organochlorines were examined for the Faroese Fisheries Laboratory (Bloch and Hoydal, 1987; Bloch, Hanusardóttir, Davidsen and Kraul, 1987). Samples were taken from 5 different schools (see Table 1).

Foetuses. The sex, length and weight of foetuses were recorded. In addition to data on the 29 foetuses sampled (see Table 1), data on a further 34 foetuses sampled between 1958 and 1964 by J. S. Joensen, the Faroese Fisheries Laboratory, is added (Table 3). Some of this data has previously been used by Frazer and Hugget (1959).

Stomachs. 74 samples of stomach contents were taken from 4 different schools (see Table 1). Samples of stomach contents were taken on the beach, and then brought to the laboratory and conserved in 70% alcohol. 3 different catches from August-September 1984 are treated by Desportes (1985).

Endoparasites. These were sampled from stomachs and abdominal cavities and conserved in 70% alcohol.

Weight. 7 whales were weighed whole to the nearest kg on a lorry balance before partition took place.

Statistical analysis. The results are expressed as mean ± standard error (sem) and the term »significant« is used solely in the statistical sense of differences significant at the 5% level of probability.

Results and discussion

School composition. The length frequency distribution was obtained from 8 total schools (Fig. 3, a-h; N=541). The figures show the normal picture for a species with a polygynous social structure (Amos, Barret and Dover, 1991) with males growing longer

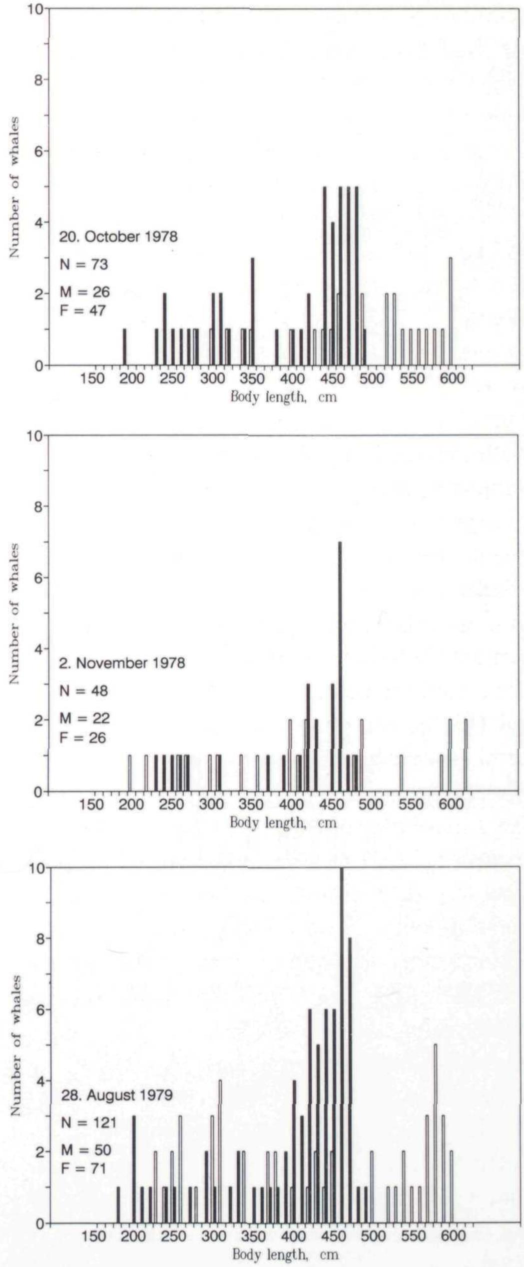
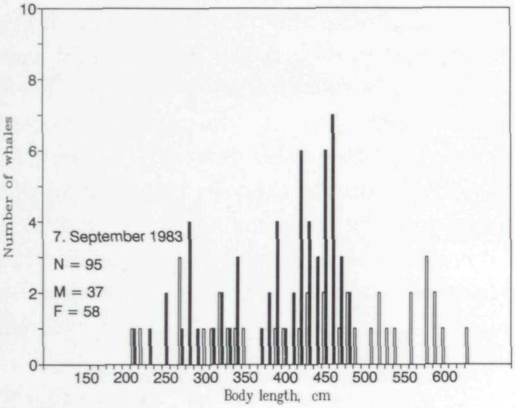
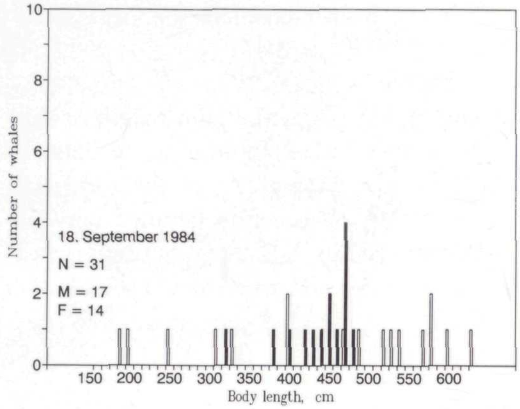
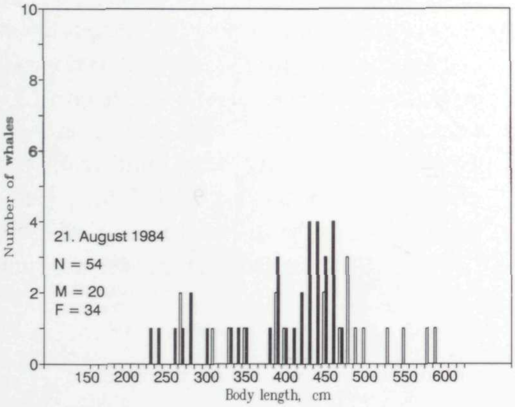
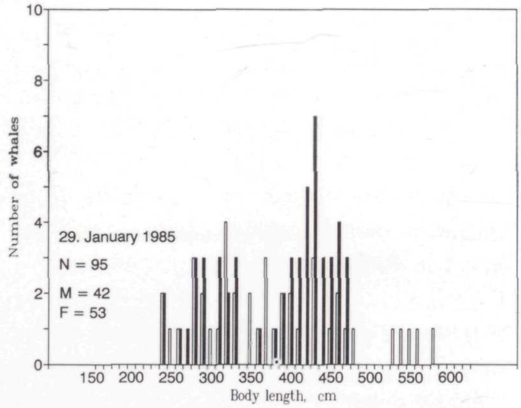


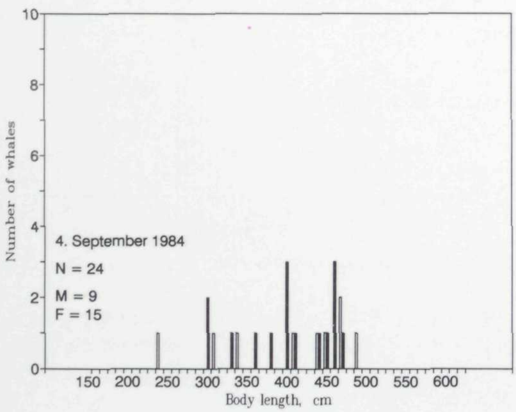
Fig. 3. Length frequency distribution histogram for 8 different catches of long-finned pilot whales in Faroe Islands in the period 1978 to 1985, a-h. Empty stacks = males, filled = females. N=541.











than females. But the occurrence of only a small number of large males in some of the schools could be due to the fact that only a part of a bigger school was caught, as is known to be the case, for instance, in whales taken on September 4, 1984 and January 29, 1985.

For 5 of the schools (N=388) the average composition of reproductive states was recorded (Fig. 4). It should be mentioned that the figures representing adult females of unknown reproductive state certainly may

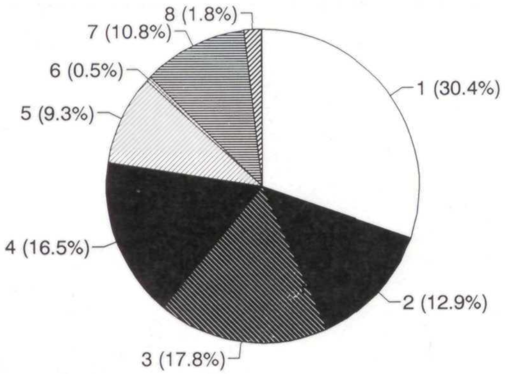


Fig. 4. The average composition of 5 schools of long-finned pilot whales from the Faroe Islands from the period 1978 - 1985; N=388. 1 = 118 immature males; 2 = 50 mature males; 3 = 69 immature females; 4 = 64 mature females without any further information; 5 = 36 pregnant females; 6 = 2 pregnant and lactating females; 7 = 42 lactating females; 8 = 7 resting females.

include some lactating females which have not been recorded as such, thus underestimating the number of lactating females. Half of the population (48.2%) is composed of immature animals, 38.9% of mature females, while only 12.9% is made up of physiologically mature males. Of these, only a part will be functionally mature males which migrate between schools (Andersen, in print; Amos *et al*, 1991; Desportes, Saboureau and Lacroix, in print).

Age. Of the 267 sampled mandibles, the age of 139 was determined, with a maximum age of 27 years for the males and 32 years for the females (Fig. 5, a and b). The age of an average whale was found to be 11.4 ± 0.7 years for both sexes (N=139), 10.0 ± 0.9 years for males (N=58), and 12.5 ± 0.9 years for females (N=81). The material from the Faroes from the period 1986-1988 recorded maximum ages of 46 years for males and 59 years for females (Bloch *et al*, in print, c). From New Foundland the oldest male was 36 years, and the oldest female 57 years after the reexamination (Kasuya *et al*, 1988b). But even with the above-mentioned reservations, it is also clear from this present material that females exceed males in age, as a result of a higher natural mortality rate in males (Bloch *et al*, in print, c).

Examinations of growth patterns of the long-finned pilot whale (Fig. 5) show a high growth rate until the beginning of sexually maturity (at the age of 8 for females; 16 for males, Bloch *et al*, in print, c; Desportes *et al*, in print). After that, the growth rate slows down approaching an asymptotic length L_∞. Included in the male and female growth curve in Fig. 5 is the fitted line from the Laird/Gomertz growth model (Laird, 1969) calculated from the material from 1986-1988 (Bloch *et al*, in print, c). Taking into account

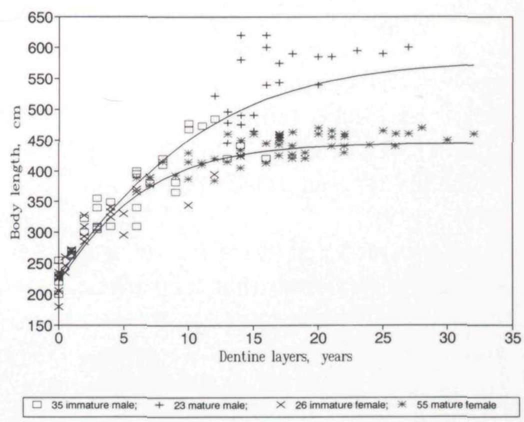


Fig. 5. Length at age, determined from tooth dentine GLG's, in the long-finned pilot whales off the Faroe Islands. The Laird/Gomertz growth formula is included. N=139.

the reservations concerning ages older than 13-15 years, a good agreement is visible. The growth formulas for both sexes are:

♂♂: $L = 232.04\, e^{0.1120/0.120(1-e^{-0.120t})}$

$L_\infty = 590\text{cm}$

♀♀: $L = 223.69\, e^{0.1172/0.168(1-e^{-0.168t})}$

$L_\infty = 440\text{cm}$

where **L** is length in cm and **t** is the age in years.

The age frequency distribution showed two concentrations of animals, one consisting of immature whales up to 8 years for females and 15 years for males, and the other consisting of the mature group, with a peak at about 17 years of age for both sexes (Fig 3).

Length. 554 whales from 8 entire schools were sexed and measured for length and divided according to maturity (Fig. 6, a and b). An average Faroese long-finned pilot whale measures 405.1 ± 4.1 cm, the males 423.8 ± 7.7 cm on average (range: 186-625 cm, N=229) and the females 391.8 ± 4.2 cm on average (range: 180-490 cm, N=325). The pattern did not differ from that previously found by Joensen (1962) and Moore *et al* (1978; 1979).

Lengths recorded in the Faroes agree with previous observations that the Faroese long-finned pilot whales grow longer than those caught off New Foundland (Sergeant, 1977; Moore *et al* 1978; 1979). The Faroese samples were more similar to the findings from the British strandings, with males up to 630 cm and females up to 546 cm (Kock, 1956; Martin, Reynolds and Richardson, 1987).

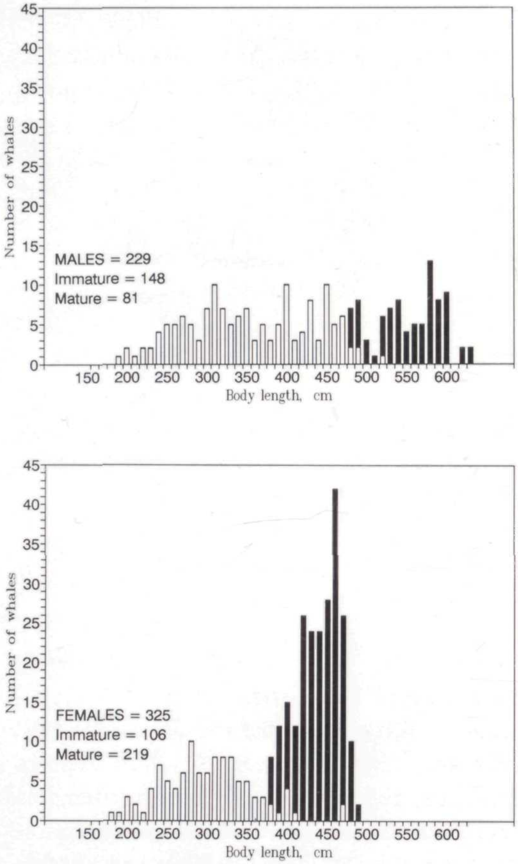


Fig. 6. Length frequency distribution histogram for males (a), and females (b) of long-finned pilot whales in the Faroe Islands in the period 1978 to 1985. Empty stacks = immature whales, filled = mature whales. N=554.

This could be an indication of three things: 1) that Faroese and British pilot whales are more closely related genetically, or 2) that they may have better feeding conditions than the pilot whales around New Foundland, or 3) that there could be more than one stock of pilot whales.

The short-finned pilot whale, *G. macrorhynchus*, off Japan is shown to be divided into two populations with different life parameters (Kasuya, Miyashita and Kasamatsu, 1988a; Wada, 1988; Kasuya, in print; Kasuya and Tai, in print, a; in print, b).

The length frequency distribution shows groups of both the immature and the mature whales of both sexes (Fig. 6, a and b). The immature animals have a peak at 352.0 ± 6.4 cm for the males, and 297.5 ± 5.5 cm for the females. For the mature whales the peaks were at 551.8 ± 4.4 cm for males, and 437.4 ± 1.8 cm for females. Males grow longer on average than females, with 54.5 cm for the immatures, and 114.4 cm for the matures. Since the length at birth is nearly the same (see below), this would point to a higher growth rate for the males, especially in relation to their shorter life span.

Weight. The 7 whales weighed before partition showed a correlation between age, length, skinn and weight. The weighed animals consisted of a newborn, the largest male, and 5 in between (Table 2). The weight-length relationship is close and exponential as is normal for animal growth and follows the formula:

2. $\mathbf{W = 0.00023 \times L^{2.501}}$

where **W** = total body weight in kg, **L** = total body length in cm. A single equation was found to be satisfactory for both sexes of all ages and throughout all months of the year (Lockyer, in print, b).

At birth, the animals are estimated to weigh about 100 kg (Sergeant, 1962; Desportes, 1983; Martin *et al*, 1987;), while large males of 24 skinn probably weigh close to 2.5 tonnes. This examination showed, however, that Müller (1882; 1884) was wrong when he said that a 20 skinn whale weighed 2,000 pounds; it will weigh twice that, namely about 2 tonnes.

Skinn. The skinn is the standard, traditional means of evaluating quantities for consumption and as such is a sort of weight measure-

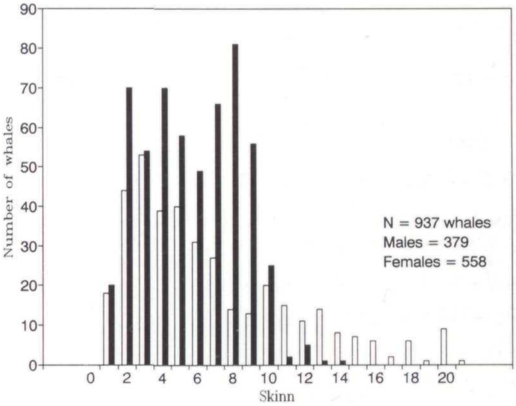


Fig. 7. Skinn value frequency distribution histogram for long-finned pilot whales in the Faroe Islands in the period 1978 to 1985. Empty stacks = males, filled = females. N=944.

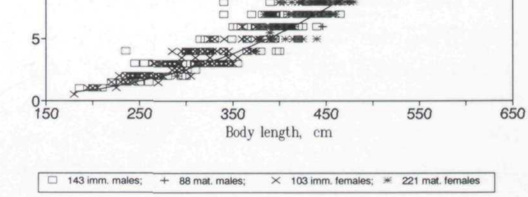


Fig. 8. Skinn value at body length in the long-finned pilot whales off the Faroe Islands. The formula for the correlation isincluded. N=555.

Table 2. Weight of 7 long-finned pilot whales off the Faroe Islands with the usable amounts of meat and blubber for consumption calculated.

Sex	Skinn	Length cm	Weight kg	Derived netto kg	Utilization %
Female	1	250	230	69	30
Male	3	310	270	207	77
Female	5	420	760	345	45
Female	7	415	830	483	58
Female	10	470	1140	690	61
Male	13	580	1990	897	45
Male	18	585	2080	1242	60
	57		7300	3933	54

ment. When the skinn value is assessed, the fatness and overall condition of the whale is also taken into consideration. The highest skinn values found for females was 14 skinn, and the highest for males was 22 skinn (Fig. 7), but Dalsgaard (1957) mentions a few males of up to 30 skinn (Bloch and Zachariassen, 1989). The average whale was valued at 6.1 ± 0.1 skinn (N=944), while a male was 6.8 ± 0.2 skinn on average (N=379), and a female 5.6 ± 0.1 skinn (N=565).

The only difference between the skinn-length curve for the two sexes was that females stop growing in length before males (Fig. 8). The relationship follows the equation:

3. $\mathbf{S = 6.54 \times 10^{-7} \times L^{2.66}}$

where **S** = skinn value, **L** = total body length in cm (Bloch and Zachariassen, 1989).

The personal assessment of the condition of the whales will result in some scattering on the curves. Very fat animals in good condition would be placed to the left of the concentration, and lean or wounded animals to the right.

The skinn at age shows the same pattern with a power function as a weight at length (Table 2). Also here the figures show a clear difference between the sexes caused by the slower growth of the females. Again, the personal assessment in the skinn valuation gives some scattering around the concentration, with the whales in good condition placed at the top of the curves and the lean and wounded at the base.

Growth

Foetus growth and size: All 61 foetuses are represented in Table 3.

The weight and length of 19 foetuses are recorded (Fig. 9), and for the foetuses the growth was also exponential but with a steeper correlation than for the post-natals following the equation:

4. $\mathbf{W = 0.00006 \times L^{2.677}}$

where **W** = total body weight in kg, **L** = total body length in cm (Lockyer, in print, b).

Table 3. Length and weight of long-finned pilot whale foetuses off the Faroe Islands. Note the twins from Húsavík 21/08/1958. N = 61 lengths, 19 weights. F = Female; M = Male.

Locality Date	Sex	Length cm	Weight g
Húsavík	M	170	
31/08/1958	F	162	
Twins	M	38	
	M	38	
	F	70	
	F	40	
	M	42	
	F	43	
	?	45	
	?	38	
	?	9	
Húsavík 13/07/1960	?	110	
Húsavík	M	140	
07/08/1961	M	80	
Sandur	M	190	
28/08/1963	M	50	
	F	150	
	F	160	
	M	50	
	M	60	
	F	50	
	M	80	
	F	60	
	F	80	
	M	90	
Sandur	M	80	
28/08/1963	F	60	
	M	50	
Gøta	M	24,5	
11/08/1964	F	43	
	M	109	
	F1	43	
	M	10	
	F	50	
Tórshavn	M	10,4	21,3
28/08/1979	F	59	3100
	M	27	373
	M	23	232
	F	165	
	F	50	1700
	M	21	159,9
	F	23	220
	M	42	1250
	M	180	
Fuglafj.	?	2	0,78
21/08/1984	?	4,5	1,85
	M	19	136,4
	M	16	75,6
	M	211	54
	F	154	
	F	162	
	M	159	
Klaksvík	F	166	
04/09/1984	F	42	1250
	F	175	
Tórshavn	F	26,5	223
18/09/1984	F	94	76,5
	F	176	6500
	M	46	2000
	F	32	501
	F	64	4000
Klaksvík	F	155	
29/01/1985	F	55	

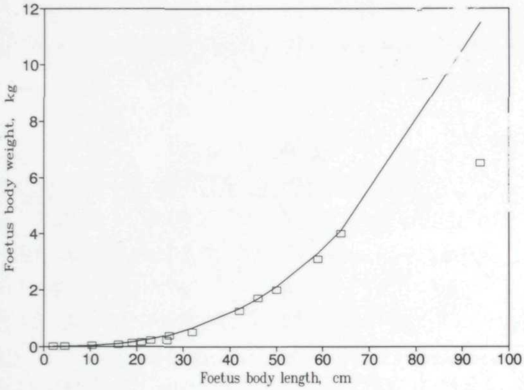


Fig. 9. Total body weight at length for pilot whale foetus. N=19.

The largest foetus found in this material was 190cm, and it was longer than the shortest newborn of 180cm. In Desportes (1983) the birth length was calculated at 171cm for the French stranded pilot whales. This material seems to indicate that newborn pilot whales in the Faroes are a little larger.

There would appear to be a tendency for the newborn females to be shorter at birth than the males, since 8 females and only 4 males measured shorter than 200cm (Fig. 3). Shorter female newborns were indicated in Sergeant's material (1962: Fig. 10, p. 16) and Kock's (1956: 66).

Table 4. Sex ratio of long-finned pilot whales off the Faroes Islands.

Locality	Date	Size of School	Males	Females	
			No.	No.	%
Hvalba	28/08/78	317	114	203	64.0
Tórshavn	20/10/78	73	26	47	64.4
Tórshavn	02/11/78	48	22	26	54.2
Tórshavn	28/08/79	121	50	71	58.7
Tórshavn	07/09/83	95	37	58	61.1
Vestmanna	17/07/84	73	34	39	53.4
Fuglafjørður	21/08/84	54	20	34	63.0
Klaksvík	04/09/84	24	9	15	62.5
Tórshavn	18/09/84	31	17	14	45.2
Klaksvík	29/01/85	95	42	53	55.8
		931	371	560	58.2 ± 1.8

Table 5.

Sex ratio of foetus, young, sub-adult and adult pilot whales off the Faroe Islands. The length borders between sub-adults and adults were fixed at 375 cm for females, and 480 cm for males. N=585.

Sex	Foetus		Sub-adult		Adult	
	No.	%	No.	%	No.	%
Female	29	50	97	40	207	72
Male	29	50	144	60	79	28

Sex ratio

Sex ratio in different schools: 10 entire schools (range: 24-318 animals) were sexed (Table 4). The sex ratio was biased towards females, comprising on average 58.2 ± 1.8% females (N=931). The range was 45.2-64.4% females, and the difference in sex ratio is significant ($p<0.001$). Only a single school contained more males than females (18. September 1984, Table 4), but especially this school is known to be a part of a bigger one. The sex ratio of 58.2% females recorded in the present study agrees with that observed in other studies from the Faroes, 60% (Joensen, 1962; Moore *et al*, 1978; Bloch *et al*, in print, a), and compares with the ratio found from Orkney, 55% (Kock, 1956), British strandings of 62% (Martin *et al*, 1984), Iceland of 68% (Sigurjónsson, Víkingsson and Lockyer, in print) and from New Foundland of 65% females (Sergeant, 1962).

From the drive fishery and small-type whaling off Japan of the short-finned pilot whale, *G. macrorhynchus*, it has been shown that the two species of *Globicephala* differ from each other in some biological parameters. Nevertheless, these schools also contain more females than males with 67.3% females (Kasuya and March, 1984; Kasuya, in print; Kasuya and Tai, in print, a; in print, b).

But this was quite the opposite of the sex ratio in landed schools of another small cetacean, the porpoise *(Phocoena phocoena)*, where the proportion of females is 24% (Møhl-Hansen, 1955), which indicates that different species seem to have different school structures.

Neo-natal sex-ratio: 57 foetuses were sexed, showing an equal sex distribution of 50% female foetuses, (Table 3 and 5). The number of foetuses from this material is too small to examine any trend in sex ratio changes during gestation.

Post-natal sex-ratio: The sex-ratio of 8 schools was recorded (N=541, Table 6), where the sexual maturity was fixed at a length of ≥ 480 cm on average for the males, and ≥ 375 cm for females following Sergeant (1962) and confirmed by Desportes *et al* (in print). The number of histologically sexually mature males in the schools was on average 15.0 ± 2.8% (4.2-29.0%), and 41.4 ± 1.0% for females (35.8-45.8%). On average, there were 2.8 ± 1.2 times more mature females than males in the schools (range: 1.4-11.0, N=541). The proportion of functionally mature males is considerably smaller (Desportes *et al*, in print).

Sex frequency at age: When the whales were distributed according to age (Table 5), the difference in male percent decreased with age in the post-natals, while the foetuses had an equal ratio at birth, as also shown in the material from New Foundland (Sergeant, 1962: 67).

Sex ratio over time: Since 1884 (Müller, 1882; 1884), sex frequency has been calculated several times in investigations from the Faroes and New Foundland (Table 7). It appears that male frequency has not changed in the period 1952-1985, but is significantly higher than in 1883 ($z=6.2$; $p<0.001$).

According to Faroese whaling statistics dating back to 1584, pilot whales occur in the Faroese waters periodically with a cycle of about 120 years (Joensen and Zachariassen, 1982; in print; Bloch, Joensen, Hoydal

Table 6. Adult female and male ratio of long-finned pilot whales off the Faroes Islands.

Date	Size of grind	MALES No.	Adult	% ad.♂♂ of grind	% ad.♂♂ of Σ♂♂	FEMALES No.	Adult	% ad.♀♀ of grind	% ad.♀♀ of Σ♀♀
20/10/78	73	26	15	20,5	57,7	47	30	41,1	63,8
02/11/78	48	22	8	16,7	35,4	26	19	39,6	73,1
28/08/79	121	50	21	17,4	42,0	71	53	43,8	74,6
07/09/83	95	37	16	16,8	43,2	58	40	42,1	69,0
21/08/84	54	20	6	11,1	30,0	34	24	44,4	70,6
04/09/84	24	9	1	4,2	11,1	15	11	45,8	73,3
18/09/84	31	17	9	29,0	52,9	14	13	41,9	92,9
29/01/85	95	42	4	4,2	9,5	53	34	35,8	64,2
N	541	223	80			318	224		

Table 7. Sex ratio of long-finned pilot whales off the Faroe Islands and New Foundland (Sergeant, 1962) collected from different examinations in different years.

Year	No. of whales	No. of pods	No. of males	Male %	Area	Source
1883	1624	8	545	33.6	Far. Isl.	Müller, 1884
1952-1957	4603	?	1825	39.6	New F.	Sergeant, 1962
1962	190	2	76	40.0	Far. Isl.	Joensen, 1962
1962-1978	556	5	221	39.8	Far. Isl.	Moore *et al*, 1979
1978-1985	552	8	236	42.8	Far. Isl.	present study
1952-1985	5901		2358	40.0		1952-1985 pooled

Table 8. Reproductive states in female long-finned pilot whales off the Faroe Islands. N=236.

Date	No. of females	No. of ad. females	No. of pregnant females	%	No. of lactating	No. of whales in senescence
21/08/58	65	44	10	15		
13/07/60	11	2	1	9		
07/08/61	24	14	2	8		
28/08/63	41	28	14	34		
02/11/78	26	19	6	23		
21/08/84	36	27	43	18	10	2
04/09/84	16	6	44	25	5	
18/09/84	17	13	6	35	6	1

and Zachariassen, 1990b). One possible explanation for a variable sex-ratio through time could be the placement of the examinations in relation to the c.120-year cycle of pilot whale frequency. Müller's examination was at the end of an earlier cycle near the lowest occurrence, while the other examinations were close to the top of the next cycle. Hoydal (in print) showed a linear correlation between the catch of squid and pilot whales around the Faroes. A possible explanation for varying male frequency could be that in low catch periods with little food, more males may die of exhaustion and starvation in connection with intraspecific fighting.

From the Japanese small-type fishery, a gradual decline in the male percentage over a 30-year period has been shown, and it is suggested that this is due to a selective exploitation of adult males (Kasuya and Marsh, 1984: 296). This is not comparable with the Faroese findings of varying male percentage through time, since whole schools are taken without selection according to sex or any other factor.

Fighting marks. 73 animals from Vestmanna, July 17, 1984 were examined for fighting marks. This school was not measured for length, but the skinn values were available. The school was divided into young and subadults (0-6 skinn), and adults (7-22 skinn). Both recent and older fighting marks were observed on the skin, as well as some very old marks, where the distance between the marks had grown during the life of the whale.

This material showed that all the adult males, but only 57% of the adult females, had tooth scars. Among the juveniles and sub-adults, 58% of the males and 50% of the females had tooth scars. According to Martin *et al* (1987: 19), tooth scars were also commonly found on adult male whales stranded in Great Britain.

The opinion of Sergeant (1962: 78) was that tooth scars originated from the hunts themselves, where scars occurred in hunts from which the whales had escaped. This is not in agreement with Faroese hunting procedure, where an entire school is taken, and wounded whales do not escape. Furthermore, fighting marks are observed on stranded whales which are not the object of hunting (Martin *et al*, 1987). The hypothesis of the present paper is that tooth scars derive from intraspecific fighting between males. But until now there has still been nothing to suggest that the scars themselves are lethal.

Fighting marks as a possible explanation for the biased sex ratio. A sex ratio in favour of females can be explained in three ways:
Firstly: A majority of females could be normal in the primary sex ratio. The material presented here, however, showing an equal number of both sexes at birth (Table 5), suggests otherwise.
Secondly: The pilot whale could have a geographical segregation as occurs for example in porpoises (Møhl-Hansen, 1955: 378) and sperm whales, *Physeter macrocephalus* (Degerbøl, 1940: 109). Until now, however, schools composed of males only have not been recorded in the strandings or whale drives (Kock, 1956; Sergeant, 1962; Martin *et al*, 1987).

In the Faroese statistics, schools composed of whales of more than 12 skinn on average would mean they are made up almost exclusively of large males. Until now, only 5 schools reported in the official whale statistics may represent such male-only schools:

1. Hvannasund in 1916: 47 animals,
2. Miðvágur in the 1930's: 30-40 animals,
3. Hvalvík, 3. August 1938: 27 animals, an average of 19.6 skinn.
4. Gøta, 31. August 1979: 27 animals, with an average of 11.9 skinn.
5. Tórshavn, 18. November 1989: 8 males, an average of 10.4 skinn.

For no. 4 some reservations have to be made. In Fuglafjørður, October 25, 1988, 15 pilot whales were caught with an average skinn value of 11.4. This was *not* a male school, but contained an equal number of males and females. It is not, therefore, certain that school no. 4 in the above list was a male-only school.

But these four or five schools could not be enough to explain a general female frequency of 58% in the schools.

The possibility also exists that males, alone or in schools, could stay in offshore waters where the winter areas are supposed to be (Sergeant and Fischer, 1957; Brown, 1961), and where pilot whales are seen all year round (Brown, 1961; Bloch, Gunnlaugsson, Hoydal and Sigurjónsson, in print, b; Joyce, Desportes and Bloch, in print). This could be an explanation for the absence of male-only schools in strandings and drives, but this would not agree with Mercer's observations (1967) from one of the winter areas in New Foundland, where mixed schools of different sizes were observed.

Thirdly: The natural mortality may be higher in the lifespan of males, as also seems to be shown by Sergeant (1962: 67), and was mentioned by Martin *et al* (1987) and shown by Bloch *et al* (in print, c).

One reasonable hypothesis for a higher male mortality could be intraspecific male fights within the school. Faroese fishermen have observed fights between large males using their teeth. After shooting one of the males from the boat for food, fishermen described fresh, bleeding wounds located under the dorsal fin which were made by another male (J. Petersen, pers. comm.).

Reproduction

Sexual maturity. The age at attainment of sexual maturity is different in males and females.

Males: In males, one testes from 43 different animals was weighed, and both testes from 15 animals. In newborn males the testes measured about 10 g and 8 cm growing to a recorded maximum weight of 5.500g, with a length of about 45 cm among the largest males. Differences between the testes from the same animal (range: 0.0 - 28.9%; N = 15)

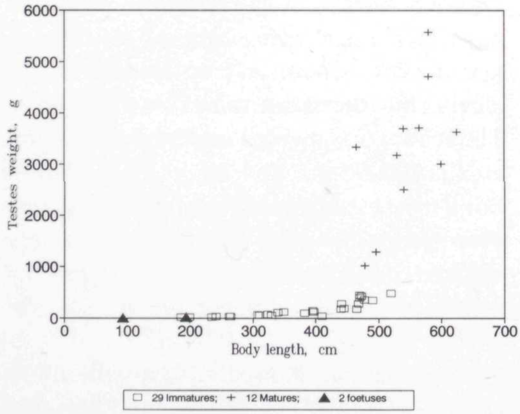


Fig. 10. Testes weight at body length in long-finned pilot whales off the Faroe Islands. N=43.

with a mean of 7.2 ± 1.8 (r = 1.0) was shown. The testes grow slowly until a body length of about 480cm at 12 years of age and a testes weight of about 300g, at which point the testes begin to increase rapidly in weight (Fig. 10). Histological examinations of the present material display a range of 446-520cm and 12-18 years of age at the attainment of sexual maturity (Desportes, per. comm.). The males were therefore defined as sexually mature at about the time when their testes began to grow rapidly. This occurred on average with a body length of 480cm and age of 11 years. This is in agreement with the findings of Sergeant (1962:45) from New Foundland of 490 cm and 12 years (see also Perrin and Reilly (1984: 103)), as well as the findings by Desportes *et al* (in print).

Females: In the females, both ovaries from 158 animals were weighed and examined in order to find the corpora. The females were defined as mature when at least one corpus (luteum or albicans) was found (Perrin, Brownell and Myrick, 1984; Perrin and Reilly, 1984: 101). But to establish the range length for attainment of sexual maturity, females with only one corpus luteum are considered in the present study. On average it occurred with a body length of 375 cm (range 375-445cm, N = 58, Fig. 11) and an age of 6 years (Fig. 3), with a range from 6-13 years. The wide range in length and age could perhaps indicate that the attainment of female maturity is more a question of weight than age, as pointed out for the porpoise (Møhl-Hansen, 1955: 380) and in connection with further examination of the pilot whale (Bloch *et al*, in print, c).

Studies in New Foundland showed that

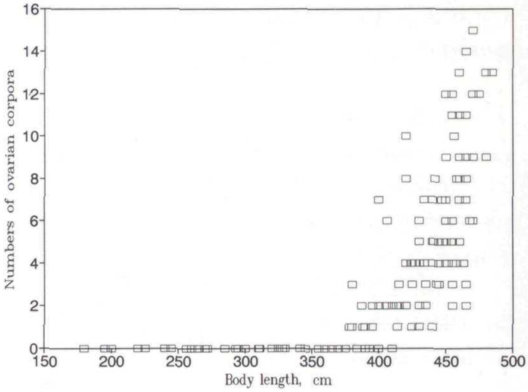


Fig. 11. Number of ovarian corpora at body length in long-finned pilot whales off the Faroe Islands. N=158; r=0.57; t=4.83.

the females of the long-finned pilot whale were mature on average at a length of 365 cm and 6 years (Sergeant 62: 42). The short-finned pilot whale is not directly comparable since it grows larger, so here the females reach sexual maturity at an age of 9-9.5 years (Kasuya and Marsh, 1984; Kasuya and Tai, 1991b).

Pregnancy: The number of pregnant females in 7 schools was recorded (Table 8). The numbers found represent a minimum figure because not all females were examined, and it was sometimes difficult to find the smallest foetuses in the time available for examination.

The length of 61 foetuses, all from July to September, was measured (Table 3). Nearly all the foetuses were placed in two distinct groups, one comprised of 15 very big ≥ 140 cm foetuses, and 30 in another group of small foetuses up to about 100 cm.

If the gestation time is known, the expected time of birth can be calculated. The length of gestation is said to be 10-14 months in Frazer and Huggett (1959), 15.5 months in Sergeant (1962), whereas Harrison calculated 9-12 months (1949: 250). Assuming a gestation time of 15.5 months, this examination will show birth times from early October to late November, June, August and mid January, i.e. nearly all year, as pointed out by Müller (1884: 23) who said that »the pilot whale breeds all year because the same amount of calves and pregnant females are always found«. Harrison (1949: 250) concluded the same as Müller. Desportes (1982) also agreed with this hypothesis, but suggested peaks of birth frequency in August and conception in April respectively, and the present material did not indicate otherwise. This was also confirmed in further examinations by Desportes *et al* (in print).

The percentage of pregnant females appeared to vary from 8-35%, and the largest number of pregnant females was found in September. It must be mentioned that 2 females in this material were found to be simultaneously pregnant and lactating (Fig. 4).

Twins: Müller (1882; 1884) mentioned once seeing a pair of fully developed twin foetuses, and in the Húsavík catch from August 31, 1958, one pair of male twins of 38cm each was found (Table 3).

Duration of suckling: The reproductive stage of all females was examined in two schools: Fuglafjørður , August 21, 1984 and Klaksvík, January 29, 1985 (Table 8). There were 10 (28%) and 5 (31%) lactating females respectively. Each lactating female presumably suckled her own calf only. By counting the number of shortest newborns and lactating females, the calves suckled to a length of about 300 cm (1.5-2 years). This was in accordance with the data from New Foundland (Sergeant, 1962: 39), but was a slightly longer suckling time than was estimated by Desportes (1982; 1983). Another method to calculate the suckling time is: *no. of lactating x gestation time: pregnant females* (Kasuya and March, 1984). Based on a gestation period of 15.5 months, the data from 3 schools (Table 8) gives a suckling time of: (21:13) x 15.5 = 25.1 months, i.e. also about 2 years, which agrees with the first calculation.

Suckling time and cephalopod marks: The marks made by cephalapods are mostly placed around the mouths, although they can also be found elsewhere, especially on the belly. These marks have been examined before by Fjeldstrup (1887) and Jensen (1916).

One school consisting of 73 whales from Vestmanna, July 17, 1984, was examined for cephalopod marks. From this school the skinn values rather than the length were obtained. Only three whales had no cephalopod marks at all. Of three newborns of a value of 1, 1, 1½ skinn, two had no marks, but the third had marks, which would indicate that newborns begin to eat cephalopods soon after birth. There was, peculiarly, one 6-skinn female without any visible marks.

From three other schools 55 stomachs were examined (Desportes, 1985: 167), and 7 young 1-2 skinn animals of 186-256cm contained milk in their stomachs, the largest also beaks from cephalopods. This suggested that newborns ate cephalopods at the same time as they were suckling, as was also shown by Desportes (1985) when examining the presence of nematodes also from the cephalopods in the stomachs.

Number and size of corpora: Ovaries from 158 females were examined in detail. The corpus luteum supporting the pregnancy had an average diameter of 41.7 x 41.0 x 40.9 mm (range 8-139 mm, N=46), and weighed on average 48.2 ± 3.6 g (range: 5.8-88.3 g, N=38). The c. lutei regressed during lactation to c. albicantia with a diameter as low as 4x3 mm. The maximum number of corpora counted on one ovary was 10, compared with 15 on both, and on average, mature females contained 5.5 ± 0.3 corpora (N=117). Due to the incomplete readings of the teeth of older whales, it is not possible to state conclusively from this material that all the corpora resulted in calves or that abortions had occurred in between. But further studies, recording up to 25 corpora in a single female, conclude that not all ovulations are followed by pregnancy, since some mature females contained a larger number of corpora than would be possible for the number of calves actually born, according to the mother's age (Martin and Desportes, in prep), and since twins occur only very rarely.

There was a linear correlation (N=69; r=0.57; t=4.83) between the number of ovarian corpora and the female body length (Fig. 11).

From some schools, some of ovaries examined contained none follicles and only corpora albicantia indicating that the females were senescent (table 9): in this material specifically this was 3 whales from 2 different schools. The lengths of these females were 442-480cm, they contained 8-9 corpora each, and two of them were 17 and 24 years old.

Food and feeding

The first study of Faroese pilot whale feeding was based on the examination of 55 stomachs sampled in August and September, 1984 from this material (Desportes, 1985). Additional data was provided by Moore *et al* (1978; 1979), and by this investigation.

The long-finned pilot whale appeared to eat mainly squid in the Faroese area with the favorite prey being *Todarodes sagittatus*. Some other species found in lower frequency and in much lesser quantity in the stomachs were:

Gonatus fabricii, Desportes (1985), Moore *et al* (1978; 1979), and present data,

Eledone sp., Desportes (1985),

Teuthowenia, Taonius, Histioteuthis spp., determined by M. Clarke, Plymouth, present data, plus undetermined species, present data.

Fish represented in the stomachs were Blue Whiting *(Micromesistius poutassou)* and Cod *(Gadus morhua)*, present data. It seems that the pilot whale becomes very exclusive in the summertime around the Faroes, when *T. sagittatus* is very abundant, despite the great abundance of other prey. In Desportes (1985) among 3 species found, *T. sagittatus* had a percentage in frequency of 100%, and in number of 96%. But in wintertime, when *T. sagittatus* was absent from Faroese waters, a greater number of species (8), including fish, were found for which the percentage in number was more equal.

This feeding behaviour fits well with the later findings from the Faroes (Desportes and Mouritsen, in print), as well as the one described by Sergeant (1962) around New Foundland with a favorite prey *(Illex illecebrosus)*, which can be substituted, in case of scarcity, with other prey, including fish.

The highly seasonal catch of long-finned pilot whales in the Faroes has coincided with the seasonal abundance of their favorite prey *(T. sagittatus)*, (Joensen and Zachariassen, 1982; in print; Hoydal, in print) in the same way as in New Foundland with *Illex illecebrosus* (Sergeant, 1962; Mercer, 1967; 1975).

Miscellaneous

Albinism. Albino pilot whales have been recorded on a few occasions:

1. In *Miðvágur, in 1895*, one whale was red-brown and another snow-white (á Ryggi 1960: 15).
2. In *1938* an albino pilot whale occurred in a school in *Vágur* on Suðuroy (J. Petersen, pers. comm.).
3. In a school of 89 whales in *Vestmanna, January 11, 1970*, one whale was an albino (R. Mouritsen, pers. comm.).
4. In *1979* an albino was seen several times on the *Faroe Bank* by fishermen (R. Mouritsen, pers. comm.).
5. In *Hvannasund, 1983-84*, a female with calf was lighter in colour than the rest of the school (J. Petersen, pers. comm.).

Use of the meat and blubber. In daily use, one skinn was commonly calculated to be about 25 kg of blubber and 50 kg of meat (Joensen, 1976). From further study (Bloch and Zachariassen, 1989) an average skinn value corresponds to 34 kg of blubber and 38 kg of meat, i.e. nearly 70 kg.

If the average skinn value was multiplied with the average amount used, 70 kg, the utilization would be on average 54%, with a range of 30-77%, N=7 (Table 2), a value confirmed by Bloch and Zachariassen (1989) from a larger sample. The large variation from one whale to another in utilization can most likely be attributed to the subjective assessment.

The 54% utilization figure was higher than that for fish (47%). The remaining 46% of the pilot whale was skeleton, head and intestines. Before the introduction of electric lighting in homes, the heads were boiled down for lamp oil, and the bones were used as fertilizer in the fields.

Today intestines are used by some as bait on line fishery, and the production of manure from the remaining 46% of the whale is being considered. With a yearly catch of about 2000 pilot whales averaging 5.6 skinn (Hoydal, in print), and a 1 skinn whale weighing a total of 7300:57= 128 kg (Table 2), the yearly basis for a fertilizer industry would only be an annual amount of: $2000 \times 5.6 \times 0.128 \times 0.46 = 660$ tons.

According to Müller (1882; 1884) the smaller whales were thought best because of their delicate meat and proportionally greater amount of blubber. This is still the case today, but Table 2 could indicate a trend towards a decline in the utilization of the smallest whales.

Conclusion

The observed growth pattern demonstrated in this study, with males having a larger body size (1.28 times), shorter life span (5 years), and higher natural mortality rate than females, (Fig. 4) and a polygynous social structure (Amos *et al*, 1991) agree well with the findings for short-finned pilot whales (Kasuya and Matsui, 1984) and sperm whales (Ralls, Brownell and Ballou, 1980).

There was no connection between the mature female/male frequency in relation to either school size or the time of year. But we have to keep in mind that some of the schools are only a part of a greater school, for instance Klaksvík, September 4, 1984, and January 29, 1985, with both schools containing only 4.2% mature males. Fewer males than females in the schools are otherwise not surprising in a social animal like the pilot whales, for which it was shown that more males than females died in the lifespan (Fig. 3), despite equality at birth (Table 5).

The occurrence of fighting marks in comparison with a closer study of the school structure could be one explanation for the higher natural mortality rate in males than females in the schools.

This study has clearly shown what a unique oppurtunity the Faroese whale drive provides to examine entire schools of this small cetacean, making it possible to compare ages classes, sexes, and reproductive states. It has also become apparent that if comprehensive samples are to be taken from all animals in the landed schools, then it is necessary to have a large team of people to sample, who are ready to leave as soon as the »grind message« has been received.

Moreover, this study draws attention to the value of the old Faroese whale statistics, which contain a great deal of material about the composition of the schools and the pattern in the occurrence of the long-finned pilot whale around the Faroe Islands.

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Dorete Bloch
Zoological Department
Museum of Natural History
FR-100 Tórshavn
Faroe Islands

Úrtak

Frá 1978 til 1986 vórðu allir hvalirnir, *(Globicephala melas)*, í 10 grindum kannaðir. Eisini einstakir hvalir, sum vóru merktir heilt aftur í 1976, vórðu kannaðir.

Litleysir (albino) ella mislittir hvalir hava verið skrásettir upp ígjøgnum tíðirnar.

Í hesum 10 grindunum, sum til samans taldu 931 hvalir, lá talið á hvalum úr 24 upp í 316. Allir 931 hvalirnir vórðu kynsmettir. Kynsbýtið var í miðal 58.2 ± 1.8% kvenndýr (úr 45.2 til 64.4%). Kannaðir yvir eitt tíðarskeið tóktist talið á kalldýrum uttan um Føroyar at økjast. Í einari miðalstórari grind vóru 48.2% av grindini ikki-kynsbúgvin dýr, 38.9% búgvin kvenndýr og bert 12.9% búgvin kalldýr.

Í einari grind, sum taldi 73 dýr, vórðu merki frá bardaga kannað. Okkurt um helvtin av teimum ikki-kynsbúnu hvalunum høvdu sovorðin merki. 57% av teimum kynsbúnu kvenndýrunum, men øll tey kynsbúnu kalldýrini høvdu merki frá bardøgum. Sjónarmiðið í hesi greinini er, at tannarrini á hvalahvøljuni stava frá bardaga millum kalldýrini.

Miðallongdin á 541 hvalum var 405.6 ± 4.3 cm. Tá er miðallongdin á kvenndýrum (úr 180-490 cm) 391.7 ± 4.3 cm og miðallongdin á kalldýrum (úr 186-625 cm) 425.4 ± 7.9 cm.

Aldursmetingin av 139 hvalum sýndi, at kvenndýrini verða eldri (32 ár) enn kalldýrini (27 ár). Miðalaldurin var 11.4 ± 0.7 ár, kvenndýr 12.5 ± 0.9 ár í miðal og kalldýr 10.0 ± 0.9 í miðal.

Áðrenn teir vórðu uppskornir, vórðu 7 hvalir vigaðir. Út frá hesum verður burðarvektin mett at vera um 100 kg og eitt stórt kalldýr mett at viga 2.5 tons. So mikið sum

54% av hvali verður nýtt til mannaføði. Hetta er meiri enn tað, ið nýtt verður av fiski (47%).

Kannað varð, hvussu nógv skinn vóru í hesum 944 hvalunum. Í miðalhvalinum eru 6.1 ± 0.1 skinn, *í miðalkvenndýrinum* 5.6 ± 0.1 skinn og í miðalkalldýrinum 6.8 ± 0.2 skinn.

Í teimum størstu kvenndýrunum vóru 15 kvidnamerki at síggja á eggrótunum. Ikki øll vórðu til fullbornan hvalaunga. Í miðal vóru 5.5 ± 0.3 tílík merki at síggja á eggrótunum á teimum kynsbúnu kvenndýrunum.

Høvuðsføðin var høgguslokkur, mest av slagnum *Todarodes sagitatus*, men eisini onnur høgguslokkasløg komu fyri, fiskur somuleiðis.

So til at taka samanum kann út frá hesari gransking sigast, at *ein miðalgrindahvalur* er 11.5 ára gamal, 405 cm langur, 6 skinn eru í honum, og hann vigar um 800 kg, av hesum eru 430 kg tøk til matna sum tvøst og spik.