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The Length-Girth Relationship in Haddock and its Application to Mesh Selection

By

A. R. Margetts

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Length - Girth Data

The lengths and girths of freshly caught ungutted haddock were measured at sea in July at all times between dawn and dusk and the mean girth of haddock at each cm. length so obtained is shown in Table 1.

The lengths were measured with the tails of the fish smoothed out to give maximum overall length and were measured to the cm. below. The girths were measured with a tape measure in the form of a noose; they were read to the nearest $\frac{1}{4}$ inch with the noose just closely around but not constricting the middle part of the fish where its girth was greatest; this girth will be referred to as the natural girth.

The results are plotted in Fig. 1, Curve 1, which shows the relationship to be linear and the slope of the curve to be 1.9.

When some of the fish were measured the measuring noose was pulled tight around them so constricting the fish that they could only just be pulled through. It was found that the constricted girth was less than the natural girth by $\frac{1}{4}$ inch at 30 cm., $\frac{1}{2}$ inch at 35-40 cm. and $\frac{1}{2}$ - $\frac{3}{4}$ inch at 46 cm. length of fish. The appropriate curve showing the average size of fish just squeezed through a noose of a particular size is also shown in Fig. 1. (Curve 2).

The natural girths of several of the thinnest haddock found were also measured and the curve of the constricted girth - length relationship is also plotted as Curve 3 in Fig. 1; this curve therefore shows the length of a very thin haddock that can just be squeezed through a noose of a particular size.

Deductions from Data

The internal circumference of an 80 mm. mesh, as measured by a gauge 2 mm. thick, will be 164 mm. From Fig. 1, Curve 1, the length of haddock with average natural girth of 164 mm. is 31.5 cm. But, from Curve 2, it is apparent that a haddock of average length 33.5 cm. can squeeze through a flexible noose of circumference 164 mm. The longest haddock that can just squeeze through a flexible noose of circumference 164 mm. (i.e. the thinnest at that length) is, from Curve 3, 36.8 cm. long.

In a codend the variation in size between meshes usually ranges over 10 mm., i.e. 5 mm. either side of the mean mesh size. Thus the largest mesh in a 80 mm. codend would be about 85 mm., or of internal circumference 174 mm. By reference to curves 2 and 3, it is seen that an average haddock of length 35.5 cm. or a very thin 39 cm. haddock can just squeeze through a flexible noose of internal circumference 174 mm.

From the foregoing it can be said that, assuming the meshes in a codend to be completely flexible:-

(a) the thinnest haddock that could find and just squeeze through the largest mesh in a 80 mm. codend would be 39 cm. long,

(b) the greatest length of average condition haddock that could all find and squeeze through the largest mesh in a 80 mm. codend would be 35.5 cm.,

(c) the greatest length of average condition haddock that could just squeeze through the average mesh in a 80 mm. codend would be 33.5 cm., and

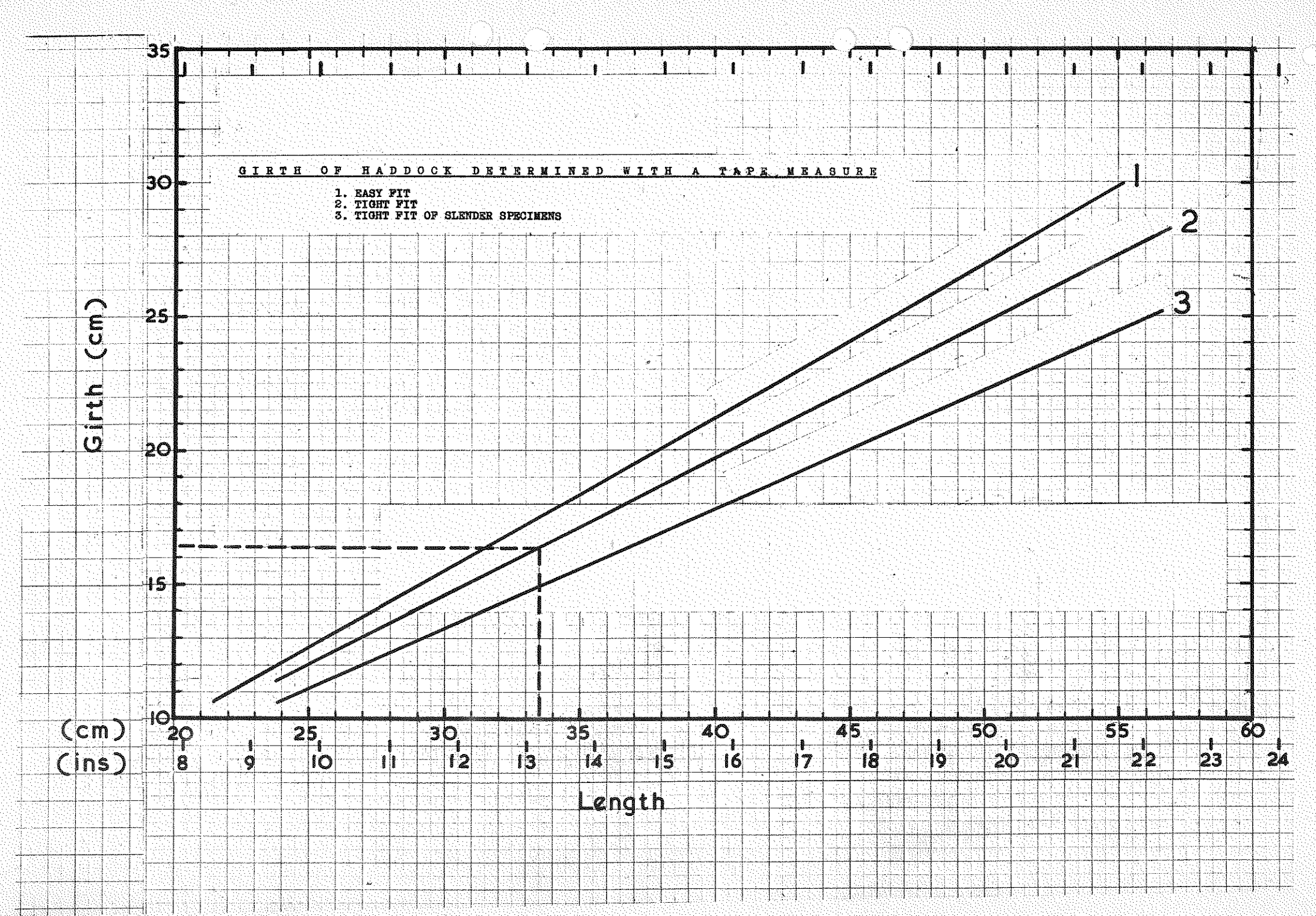
(d) the average condition haddock that could pass comfortably through the average mesh in a 80 mm. would be 31.5.

The 50% point of the 80 mm. completely flexible mesh would probably be somewhere between the latter two lengths (c) and (d) 31.5 and 33.5 cm.

If the 50% point of the 80 mm. completely flexible mesh is taken as 32.5 cm. then the factor relating mesh size to 50% point is 4.06. This is considerably higher than that derived from trawl mesh experiments by Beverton and Holt; their figure, confirmed by recent work on trawls in the United States, is 3.3. Some, if not all, of this difference must be due to there being no such thing as a completely flexible codend mesh and, further, to trawl codend meshes of the size used being rather rigid diamond shape when in action.

TABLE I - HADDOCK LENGTH - GIRTH MEASUREMENTS

Length cm.	No. Fish measured	Mean natural girth cm.	Constriction Ins.	Minimum Natural girth
21	4	11.4		10.8
22	17	11.4		10.8
23	27	12.0		10.2
24	56	12.4		11.4
25	68	12.9		12.1
26	66	13.4		12.1
27	52	14.1		13.4
28	20	14.6		13.4
29	16	15.2		14.0
30	18	15.7	$\frac{1}{4}$	14.1
31	30	16.2		15.3
32	40	16.8		15.3
33	41	17.4		15.9
34	35	18.0		16.5
35	29	18.5	$\frac{1}{2}$	16.5
36	24	19.2		17.2
37	16	20.0		18.4
38	14	20.0		19.1
39	14	20.6		17.2
40	15	21.3	$\frac{1}{2}$	19.7
41	10	22.0		21.0
42	14	22.7		21.6
43	12	23.4		22.2
44	11	23.4		21.6
45	3	24.1		22.2
46	11	24.8	$\frac{1}{2}$ - $\frac{3}{4}$	22.9
47	4	25.9		25.4
48	2	26.7		
49	3	26.5		
50	1	29.2	1	
51	1	27.3		
52	2	28.9		
53	3	28.6		
63	1	37.5		


GIRTH OF HADDOCK DETERMINED WITH A TAPE MEASURE
1. EASY FIT
2. TIGHT FIT
3. TIGHT FIT OF SLENDER SPECIMENS
Girth (cm)
35
30
25
20
15
10
1
2
3
(cm)
20
25
30
35
40
45
50
55
60
(ins)
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
Length