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Testing of a new hook design in the longline fishery for tusk (Brosme brosme) and ling (Molva molva)

by

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ABSTRACT

The EZ-Baiter Circle hook which is a hybrid design between
the classical J- and Circle hook shapes, is developed to
provide a more effective hook for use in mechanized longline
systems.   In comparative fishing trials, the new (EZ) hook
design gave significantly difference in catch rates between
the EZ- and Circle hook designs.

1. INTRODUCTION

Different new hook designs have through experimental longline
trials shown improved effectiveness compared to traditional
hook types. However, it has been difficult to adapt these new
hook designs to the most widely used mechanized longline
systems. One of these new and more effective hook designs is
the Tuna Circle hook (Peeling, 1985). To obtain higher catch
rates in automatic longlining, a modified circle hook which
is adaptable to traditional mechanized systems is developed.
This design, the EZ-Baiter Circle hook has been tested with
good results in the longlining for Atlantic cod (Gadus
morhua) and haddock (Melanogrammus aeglefinus), (Skeide et

al., 1986). This report describes comparative fishing trials with the EZ-Baiter hook in the longline fishery for tusk and ling. The main objective of the investigation was to test the effectiveness of this hook versus a standard J-hook and the Circle hook.

2. MATERIALS AND METHODS

The trials were conducted on a 90´ longline vessel, during a commercial longline operation off the west coast of Norway, from 15th to 23rd of September 1986. A total of 10 different comparative trials were conducted, but only the most interesting are described in this report:

EZ-Baiter Circle hook (Qual. 39977, No 12/0, Straight) versus:

a) Kirby Sea (Qual. 2330B, No 6, Straight, Extra long Shank, Extra thick tread). This is a standard J-hook of the same size as the EZ-Baiter hook. To avoid bias due to different thickness of the thread, this Kirby Sea hook was specially made with the same thread diameter as the EZ-Baiter hook (2.35 mm).

b) Tuna Circle Hook (Qual. 39965, No 11/0, Slightly kirbed). Thread diameter: 2.40 mm.

c) Tuna Circle Hook (Qual. 39960 D, No 13/0, Straight). This is a larger Circle hook than the No 11/0, with thread diameter 2.95 mm.

The EZ-Baiter and Circle hook designs are shown in Figure 1. All hooks were made by O. Mustad & Søn A/S.
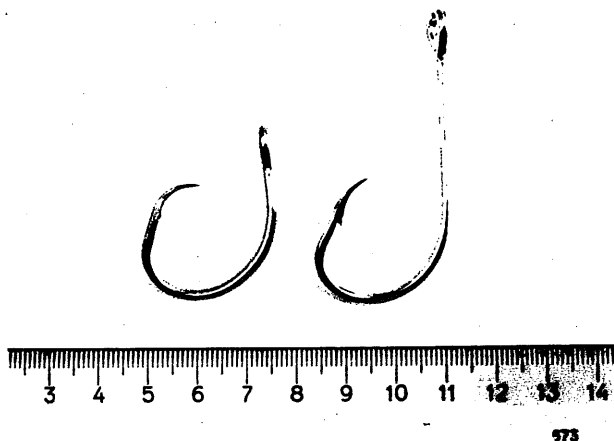
Figure 1. Hook designs.
          Left: Tuna Circle Hook, No 11/0
          Right: EZ-Baiter Circle Hook, No 12/0

Each comparative trial was based on 2 neighbouring cells (skates) rigged with two different hook types - as the unit of comparison.   During hauling, the following data were recorded for each hook:
- Hook status (Bait loss, Bait remnant, Intact bait)
- Catch (Ling, Tusk, Bycatch, Trashfish)
- Hooking position (Mouth, Throat, Other)

The total catch of ling and tusk were length measured. The data were recorded directly on a portable data terminal (Micronic 445) and then transferred to a personal computer (Kaypro II, PC), as described by Floen (1985).

3. RESULTS

3.1 A) EZ-Baiter Circle Hook, No 12/0 versus
B) Kirby Sea, No 6 (Standard J-hook)

In this trial, a total of 2905 hooks were recorded of type A
(EZ-Baiter) and 3063 hooks of type B (Kirby Sea). The results
are given in Table 1a-c.

As shown in Table 1a, the EZ-hook gave significantly better
catch rates for ling (23.7%, p=0.016), tusk (21.8%, p=0.008)
and total catch (24.4%, p=0.000). There was a size selective
effect for ling, as the standard hook caught fish of 2.6 cm
higher average length (p=0.039).

3.2 A) EZ-Baiter Circle Hook, No 12/0 versus
B) Tuna Circle Hook, No 11/0

In this trial, a total of 3289 A-hooks (EZ-Baiter) and 3345
B-hooks (Circle) were recorded. The main results are given
in Table 2a-c.

The Tuna Circle hook gave a non significant higher catch rate
both for ling (10.7%, p=0.380), tusk (12.1%, P=0.127) and to-
tal (12.2%, p=0.051). The Tuna Circle hook also caught tusk
of slightly higher average length (1.2 cm, p=0.022).

3.3 A) EZ-Baiter Circle Hook, No 12/0 versus
B) Tuna Circle Hook, No 13/0

In this trial a total of 2983 A-hooks (EZ-Baiter) and 2683
B-hooks (Circle) were recorded. The main results are given in
Table 3a-c.

The EZ-hook gave a significantly higher catch of ling (35.5%,
P=0.000), while there was no significant difference in catch
rate between the two hook types for tusk and total catch.

4. DISCUSSION

Compared with a standard J-hook design, the EZ-Baiter hook were ·found to have a significantly higher effectiveness for tusk and ling, which confirms the results of Skeide et al. (1986) in the longline fishery for cod and haddock.

The smallest Circle hook (No 11/0) gave a higher catch both of tusk and ling (non significant) while the larger Circle hook (13/0) gave significantly less catch of ling and also less tusk (non significant). From these results it is reason to believe that a Circle hook will give slightly better catch rates than an EZ-Baiter hook if both hooks are of similar size.

However, both hook designs (Circle and EZ) will be more ef-fective than a standard J-hook. This might be caused by higher hooking possibilities for these new hook designs, but observations during the trials indicate that their higher catch efficiency is caused by lower escapement rates since the fish seemed to be more securely hooked.

5. REFERENCES

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Skeide, R., Å. Bjordal and S. Løkkeborg, 1986. Testing of a new hook design (E-Z-Baiter) through comparative long-line trials. Coun.Meet.Int.Coun.Explor.Sea, 1986, B:25.

Table 1a. Catch and length data for the hooktypes A: EZ-Baiter (12/0) and B: Kirby Sea (6).

Species	Ling		Tusk		Catch*		Trashfish	
Hooktype	A	B	A	B	A	B	A	B
No. of fish	184	148	262	216	502	400	2	4
Catch rate**	6.3	4.8	9.0	7.1	17.3	13.1	0.1	0.1
Difference (%)	- 23.7		- 21.8		- 24.4		-	
p-value	0.016		0.008		0.000		-	
Average length(cm)	88.0	90.6	51.6	52.3				
No. of fish (n)	193	156	259	217				
p-value	0.039		0.340					

* Catch = Ling + Tusk + Bycatch
** Catch rate = No. of fish per 100 hooks

Table 1b. Hook status for hooks without catch (%).

Hook status	Baitloss	Bait remnant	Intact bait
Hook A (EZ)	63.9	5.8	30.2
Hook B (Kirby Sea)	70.8	4.8	24.3

Table 1c. Hooking position (%).

Species	Ling			Tusk		
Hooking posisiton	Mouth	Throat	Other	Mouth	Throat	Other
Hook A (EZ)	84.8	3.3	12.0	79.8	13.0	7.3
Hook B (Kirby Sea)	81.6	4.3	14.1	74.9	17.2	7.9

Table 2a. Catch and length data for the hooktypes A: EZ-Baiter (12/0) and B: Tuna Circle hook (11/0).

Species	Ling		Tusk		Catch*		Trashfish	
Hooktype	A	B	A	B	A	B	A	B
No. of fisk	159	179	349	398	551	629	7	8
Catch rate**	4.8	5.3	10.6	11.9	16.8	18.8	0.2	0.2
Difference (%)	10.7		12.1		12.2		-	
p-value	0.380		0.127		0.051		-	
Average lenght(cm)	87.2	86.9	52.0	53.2				
No. of fish (n)	161	182	344	403				
p-value	0.795		0.022					

*   Catch = Ling + Tusk + Bycatch
** Catch rate = No. of fish per 100 hooks

Table 2b. Hook status for hooks without catch (%).

Hook status	Baitloss	Bait remnant	Intact bait
Hook A (EZ)	65.4	6.4	28.2
Hook B (Circle)	72.9	4.8	22.3

Table 2c. Hooking position (%).

Species	Ling			Tusk		
Hooking position	Mouth	Throat	Other	Mouth	Throat	Other
Hook A (EZ)	92.5	0.0	7.5	84.0	12.6	3.4
Hook B (Circle)	88.8	3.9	7.3	77.4	18.8	3.8

Table 3a. Catch and length data for the hooktypes A: EZ-Baiter (12/0) and B: Tuna Circle Hook (13/0).

Species	Ling		Tusk		Catch*		Trashfish	
Hooktype	A	B	A	B	A	B	A	B
No. of fish	195	113	333	305	573	462	13	3
Catch rate**	6.5	4.2	11.2	11.4	19.2	17.2	0.4	0.1
Difference (%)	- 35.5		1.9		- 10.3		- 74.3	
p-value	0.000		0.846		0.085		0.024	
Average length(cm)	96.0	92.6	52.7	52.9				
No. of fish	191	119	346	308				
p-value	0.065		0.684					

* Catch = Ling + Tusk + Bycatch
** Catch rate = No. of fish per 100 hooks

Table 3b. Hook status for hooks without catch (%).

Hook status	Bait loss	Bait remnant	Intact bait
Hook A (EZ)	67.2	5.0	27.8
Hook B (Circle)	74.7	4.3	21.0

Table 3c. Hooking position (%).

Species	Ling			Tusk		
Hooking position	Mouth	Throat	Other	Mouth	Throat	Other
Hook A (EZ)	90.8	2.6	6.7	76.0	20.4	3.6
Hook B (Circle)	92.9	0.9	6.2	88.9	8.5	2.6