



## DELRAPPORT

*Fangstseksjonen*

**A COMPARISON OF THE JOINT SOVIET-NORWEGIAN  
SELECTIVITY EXPERIMENTS, JUNE 1988  
WITH EMPHASIS ON THE METHODS USED  
Nr. 05-89**

FORFATTER:  Bjørnar Isaksen		
PROSJEKT: Joint Soviet-Norwegian Investigations for 1989 Meeting in Murmansk, April 24 - 25, 1989		
DATO: 1989-30-04	PROSJ.NR.: 6153	PROSJ. ANSV.: B. Isaksen
OPPDRAGSGIV. REF.: Fiskeridirektoratet		OPPDRAGSGIVERS REF.:

**EKSTRAKT:**

In June 1988 joint Soviet-Norwegian selectivity experiments were carried out at the Rybachia Bank (Østbanken) with the two trawlers "Anny Kræmer" and "Greymachensk". The main aim of these experiments was to compare the ICES-specified method of using whole cover with that recommended by USSR. While the experiments onboard "Anny Kræmer" gave no essential difference, the experiments onboard "Greymachensk" gave distinct differences in selection factors both for cod and haddock when comparing the two methods of using codend covers. In this report the methods are discussed, and the conclusions are that the main reasons for the discrepancies found are due to differences in the codend width/cover width used, together with differences in codend material, construction, and thickness.

**4 STIKKORD:**


## INTRODUCTION

According to the protocol from the 16th Session of the Mixed Soviet-Norwegian Fishery Commission, joint selectivity experiments with two different codend covers should be undertaken during 1988, and the results reported to the 17th Session of <sup>the</sup> Commission.

## MATERIALS AND METHODS

During the meeting in Murmansk, March 22-24, 1988, the technical details of the experimental scheme were discussed in a working group (Valdemarsen 1988). It was agreed to use the Soviet construction of codend and cover as a basis (Figure 1), and change between the USSR (A) and ICES (B) specified methods by attaching the cover for method (A) on the extension piece 3 m ahead of the codend, and in the change between the codend and the extension piece for (B) (Figure 2). The last method is what was recommended by ICES when dealing with covers (ICES 1964).

The circumferences of the codend and covers in Figure 1 are:

Codend:	Stretched circumference: 7.8 m x 2 =	15.6 m
Codend cover:	Stretched circumference: 7.1 m x 4 =	28.4 m

which give:

$$\text{Circumference codend cover/circumference codend} = \underline{1.8}$$

Prior to the joint experiments the codend and cover were produced in Norway according to Figure 1, adjusted to Norwegian trawl gear, and had during the cruise with M/V "Anny Kræmer" a cover/codend proportion of 1.6 (Figure 3). The cover was moreover made from polyethylene to give minimum masking effect of the upper panel of the codend (Engås et al. 1988).

The codend and covers used onboard M/V "Gremyachensk" turned out to be a bit different from that presented in Murmansk, March 22-24, 1988. The ICES specified cover used was

of the "top-cover" version, where the upper panel of the codend was covered with a 60 mm net, and the bottom panel with a blinder with the same width as this panel (Anon 1988).

Width lower panel =	Width blinder = 0.06 m x 95	= 5.7 m
Width upper panel		= 5.7 m
Circumference codend		= 11.4 m
Width top cover =	0.06 m x 140	= 8.4 m

This gives:

$$\text{Width top cover/width upper panel} = \underline{1.5}$$

The USSR specified cover used was a whole cover (bag-type), where:

$$\begin{aligned} &\text{Circumference codend cover/circumference codend} = \\ &(0.06 \text{ m} \times 110 \times 4)/11.4 \text{ m} = \underline{2.5} \end{aligned}$$

## RESULTS AND DISCUSSION

During the Norwegian experiments no essential difference in S.F. for neither cod nor haddock were found, when the codend cover was attached at A or B (Figure 2). With a circumference of the codend cover of 1.6 times that of the codend, the attaching point has minor importance. On the other hand, when using a more spacious cover, as during the Soviet experiments, this seems to result in different S.F. for cod.

The difference that were found during this joint investigation when using the whole cover method may be due to:

1. The circumference of the Soviet codend was 2.5 times that of the codend, while the corresponding value during the Norwegian experiments was 1.6. This difference may give as result that a possible "masking effect" of the USSR specified cover will start later, and/or with a bigger catch in the cover, thus giving a higher S.F.

2. While the Soviet codend had a stretched circumference of 11.4 m, the Norwegian codend used had a circumference of 15.6 m, i.e. about 37% greater width. According to Scottish investigations (Robertson & Elmslie 1985), the selectivity decreases when the circumference of a codend is increased. The Soviet codend used is representative for their trawler fleet (10-11 m), while the other codend (15.6 m) has a circumference that is more than double of what is used in the Norwegian trawler fleet ("trouser trawl", 6-7 m).
3. The codend material used is polyamid, but different in respect of construction and twine diameter.

Regarding the Norwegian experiments, the length distribution of fish with and without codend cover gives evidence that the selection gives are influenced by a masking effect from the cover; this was not found in the Soviet experiments with the bag type cover. On the other hand, when the ICES specified top cover was used, this gave a lower S.F. for cod, thus either demonstrating a masking effect of the cover, or that the codend was not "working" properly.

## CONCLUSION

Since ICES recommended how to perform selection experiments (ICES 1964), these methods have been used in numerous studies to elucidate factors that affect size selection in trawls and Danish seine. When dealing with the covered codend methods, masking effect of the cover has often been mentioned as a bias since selection factors obtained by these methods - top cover or whole cover - very often are lower than those obtained by the alternate haul method.

The attractiveness of the covered codend methods lies in the fact that the results are obtainable from single hauls, but as mentioned before, the results are most probably biased. Increasing the circumference of the cover relative to the codend might improve the whole cover method, but nevertheless one will never get rid of the possible effect a cover has on the waterflow in the main codend, and, furthermore, the effect on the escape behaviour of the fish.

In future selectivity experiments, more emphasis should be put in the effort of getting true selection factors, and not factors that have unknown biases. The only way to achieve this is to fish the codends as during normal fishing, both in respect of fishing time, catch rates and attachments to the codends. One way of doing this is to use the alternate haul method that is free from any bias caused by a cover. However, because of the haul-to-haul variations, this method requires a large number of hauls, and have not been very attractive (Pope et al. 1975).

A variant of the alternate haul method - "trouser trawl" - is more attractive as it gives a direct comparison of two codends for each successful haul. This method has earlier been criticized, as it often has given uneven fishing between the two codends, due to different waterflow into the two legs with e.g. unequal meshsize. By introducing a vertical small-meshed net that splits the extension piece in two equal halves well in front of the codends (8-10 m), any effect of difference in waterflow and entrance area of the two codends will be kept to an absolute minimum (Figure 4).

In the last few years, several selectivity experiments have been carried out using this method (Nicolajsen 1988, Chopin 1988, Hickey & Cooper 1988 (unpubl.), Isaksen & Valdemarsen 1986, Isaksen & Larsen 1988). The modified trouser trawl method has been regarded as superior to the ordinary alternate haul method, and has especially been used when comparing the selectivity of square and diamond meshed codends.

During the ICES FTFB Working Group Meeting in Dublin, April 24-25, 1989, attention will be drawn both to this method as well as to the methods specified by ICES 25 years ago, in order to get a fresh evaluation - and hopefully later on, an "authorizing" of unbiased methods of studying mesh selection in trawls and Danish seine (Olsen 1989).

## REFERENCES

- Anon, 1988. Results of experimental works carried out by R/V "Gremyachinsk" during joint Soviet-Norwegian program on trawl selectivity in Barents Sea in June 1988. *Mixed Soviet-Norwegian Fishery Commission, 17th Session, Oslo 12-16 Dec 1988.*

- Chopin, F., 1988. Design of a vertical separator panel trouser trawl for codend mesh selectivity experiments. *ICES Fish Capture Committee, W.G. Meeting in Oostende, April 18-22, 1988.*
- Engås, A., B. Isaksen & J.W. Valdemarsen, 1988. Comparison of selectivity of 135 mm trawl codends by using the ICES and the USSR specified covered codend methods. *FTFI-rapport 18.11.88* (in Norwegian).
- ICES, 1964. General considerations on trawl and seine mesh selection and its measurements. *Coop.Res.Rep.(2).*
- Isaksen, B. & R.B. Larsen, 1988. Codend selectivity of the Danish seine as investigated by the trouser trawl method. *Coun.Meet.int.Coun.Explor.Sea, 1988/B:28.*
- Isaksen, B. & J.W. Valdemarsen, 1986. Selectivity experiments with square mesh codends in bottom trawls. *Coun.Meet.int.Coun.Explor.Sea, 1986/B:28.*
- Nicolajsen, A. 1988. Estimation of selectivity by means of a vertical split Nephros trawl. *Coun.Meet.int.Coun.Explor.Sea, 1988/B:9*
- Olsen, S., 1989. Are past mesh selection data and methods of investigation valid for today's fisheries? *ICES FTFB W.G. Meeting in Dublin, April 24-25, 1989.*
- Pope, J.A., A.R. Margetts, J.M. Hamley, & E.F. Akyuiz, 1975. Manual of methods for fish stock assessment, part III. Selectivity of fishing gear. *FAO Fish.Tech.Paper, No. 41: 1-65.*
- Robertson, J.H.B. & D.C. Emslie, 1985. Selection differences in narrow and wide codends with the same meshsize. *Marine Laboratory Working Paper No. 7, 1985.*
- Valdemarsen, J.W., 1988. Report from joint meeting in Murmansk, March 1988, on selectivity in trawls. *FTFI-arbeidsnotat 11.04.88.* (In Norwegian).

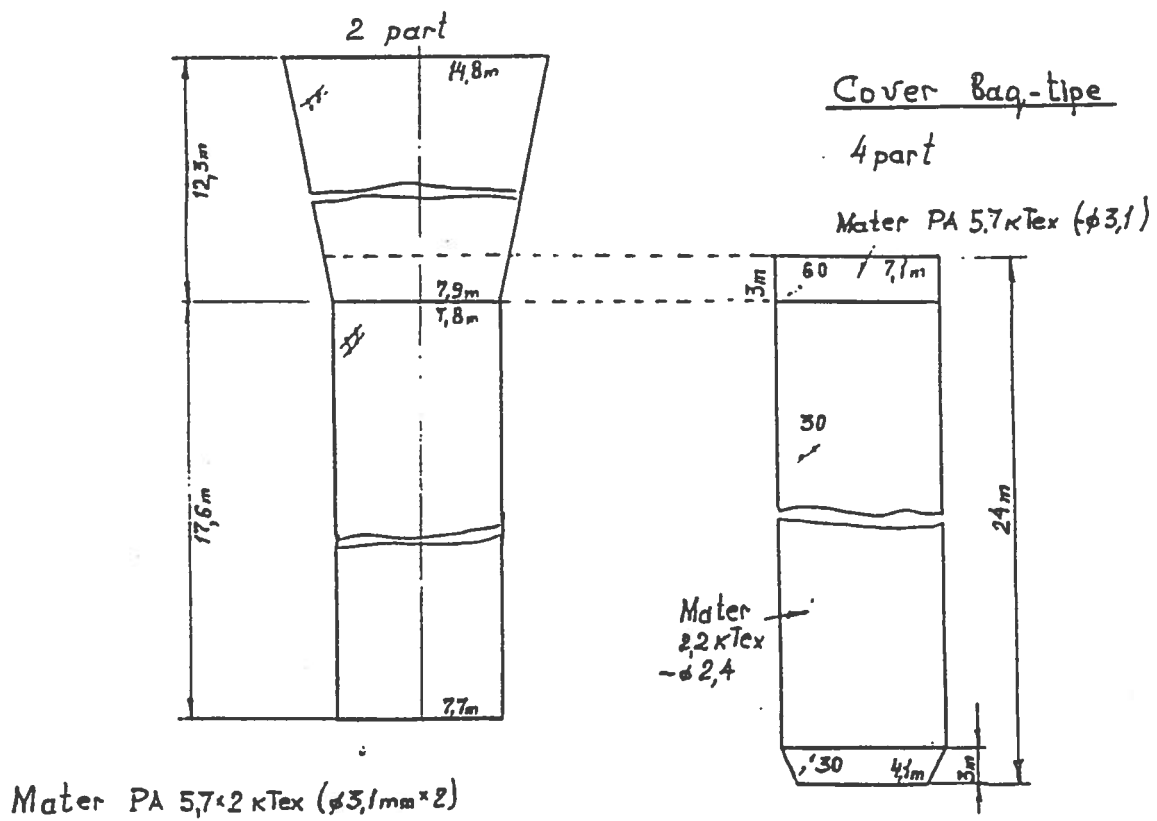


Figure 1. Sketch of the USSR-specified codend and cover, presented at the meeting in Murmansk, March 1988.

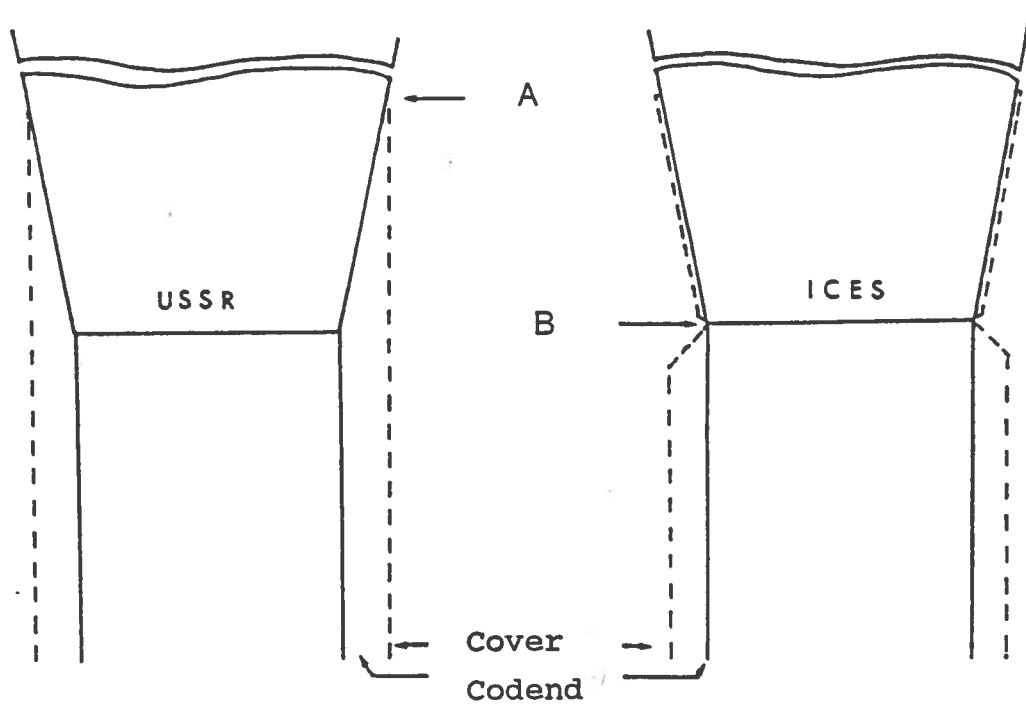


Figure 2. Attaching points for the codend cover.





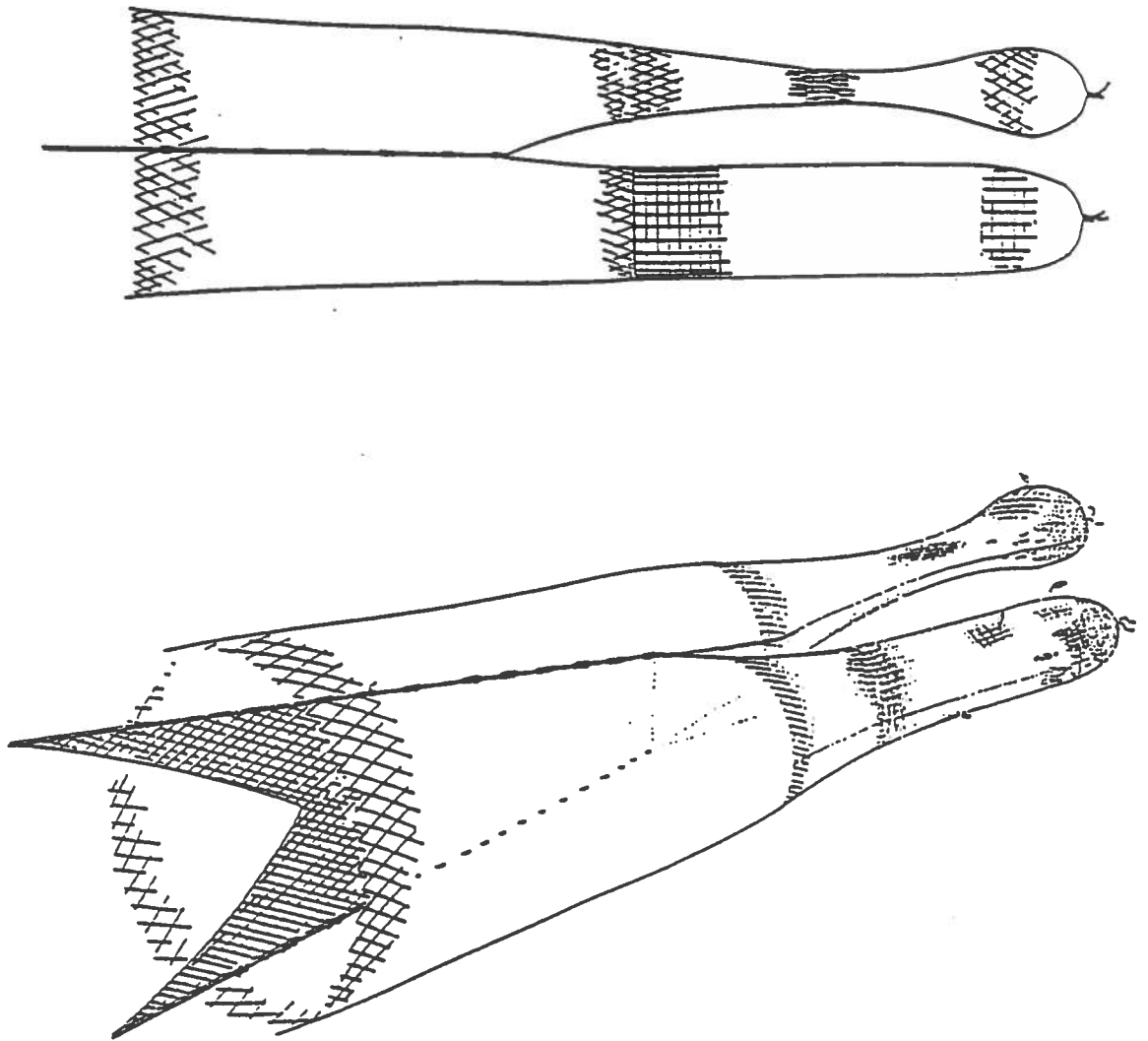


Figure 4. Extension piece with a vertical split-net, used during selectivity experiments with square and diamond meshed codends.