Acta Adriat., 29 (1/2) : 67—73 (1988)

YU ISSN: 0001—5113
AADRAY

UDK: 579 : 594
Original scientific paper

COMPARISON OF FAECAL COLIFORM LEVELS IN MUSSEL FLESH AND FLESH TOGETHER WITH INTERVALVULAR FLUID

USPOREDNO ISPITIVANJE SADRŽAJA FEKALNIH KOLIFORMA U TKIVU ŠKOLJKI I TKIVU ZAJEDNO S TEKUĆINOM UNUTAR LJUŠTURA

Nada Krstulović and Mladen Šolić

Institute of Oceanography and Fisheries, Split, Yugoslavia

Determination of the concentration of faecal coliforms in shellfish are made either on the basis of the flesh alone or on that of the flesh together with the intervalvular fluid. No essential difference in faecal coliform concentrations in shellfish flesh alone and those in flesh togehter with the intervalvuar fluid was established. Both methods are equally applicable, but the flesh togehter with intervalvular fluid method is simpler and more directly correlated to consumption patterns.

INTRODUCTION

Determination of the concentration of faecal coliforms in shellfish are made either on the basis of the flesh alone or on that of the flesh together with the intervalvular fluid. The scope of the present investigation which was performed within the framework of the Long-term Programme of Pollution Monitoring and Research in the Mediterranean Sea (MED POL Phase II) was to determine the comparability of the two techniques and, as a result the difference in criteria and/or standards utilising one or the other as the recommended methodology.

MATERIAL AND METHODS

Samples of mussels *(Mytilus galloprovincialis)* and of the sea water in their growing area were collected in the coastal area of Split (Fig. 1) in 1986 through 1987.

Determination of faecal coliforms were made in (a) mussel flesh and (b) in the flesh together with intervalvular fluid. At the same time, determination was also made of faecal coliform concentrations in the growing water.

The multiple test tube method was used for mussels, and the membrane filtration culture method for sea water. The procedures followed were as described in the WHO/UNEP reference methods for marine pollution studies (UNEP/WHO, 1983; UNEP/WHO, 1983a).

RESULTS AND DISCUSSION

Results obtained are presented in Table 1.

Table 1. List of results

Date	Station	FC-Flesh (g)	Flesh/ FC-Intervalvular. fluid (g)	FC-SEA (100 ml)	Temperature °C	Salinity ‰
09. 07. 86.	1	22	17	58	22.17	36.00
	8	16000	16000	—	22.74	35.10
	6	360	920	930	22.66	35.20
22. 07. 86.	8	1400	5400	67500	22.48	36.40
	6	1600	2400	16000	22.64	36.95
	1	140	240	60	23.18	37,10
27. 08. 86.	8	2800	1300	53800	23.16	37.23
	6	46	180	5000	23.07	37.07
	1	5400	6300	6000	24.02	37.21
02. 10. 86.	8	1300	3500	2300	20.00	37.21
	6	90	40	20	20.11	37.25
	1	34	22	12	19.45	37.56
21. 04. 87.	8	5400	16000	11500	13.00	34.85
	6	350	170	370	13.46	34.56
	2	11	11	90	14.05	35.49
	5	920	1600	600	13.58	35.12
	7	7.9	3.3	30	13.73	34.94
	9	2.6	2.1	10	—	—
09. 06. 87.	8	350	540	—	15.62	36.94
	6	17	54	1400	15.94	34.94
	2	13	4.9	5	16.31	35.32
	3	540	3500	—	16.30	35.33
	4	7,9	35	—	16.03	34.07
21. 07. 87.	8	79	160	14000	24.60	37.30
	6	160	35	140	24.30	37.34
	4	22	13	80	24.90	37.13
	2	0.2	0.2	5	25.97	36.63
27. 08. 87.	6	33	17	—	23.07	37.07
	1	11	11	—	24.02	37.21
	8	1700	1800	—	23.16	37.23

A high correlation was established between faecal coliform concentrations in the mussel tissue alone and those in flesh together with intervalvular fluid (Fig. 2). The correlation coefficient was 0.96. No essential difference in concentrations of faecal coliforms were found between them. This led to the conclusion that both methods were comparable and equally suitable.

A comparison of faecal coliform concentrations in flesh / intervalvular fluid and in flesh alone with those in the growing water showed their rela-

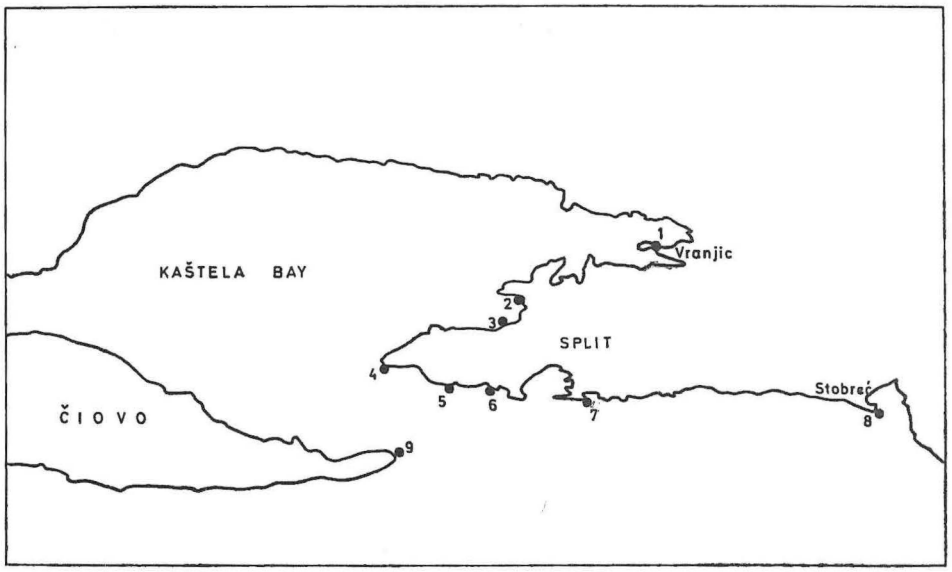

Fig. 1. Investigated area

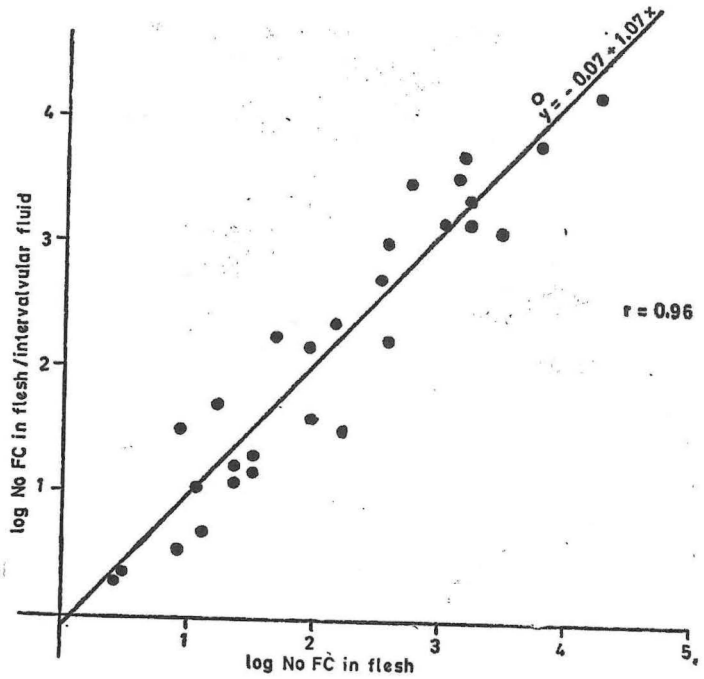

Fig. 2. Ratio of FC concentrations in flesh/intervalvular fluid to those in flesh

tionship to be for the most part proportional. This indicates that in more polluted areas, the concentration of faecal coliforms in flesh together with intervalvular fluid is higher than in flesh alone (Figs. 3 and 4). Both figures deal with the same problem. The only difference is in that the point drawn in Fig. 4 (marked with the arrow) represents an extreme case of pollution for

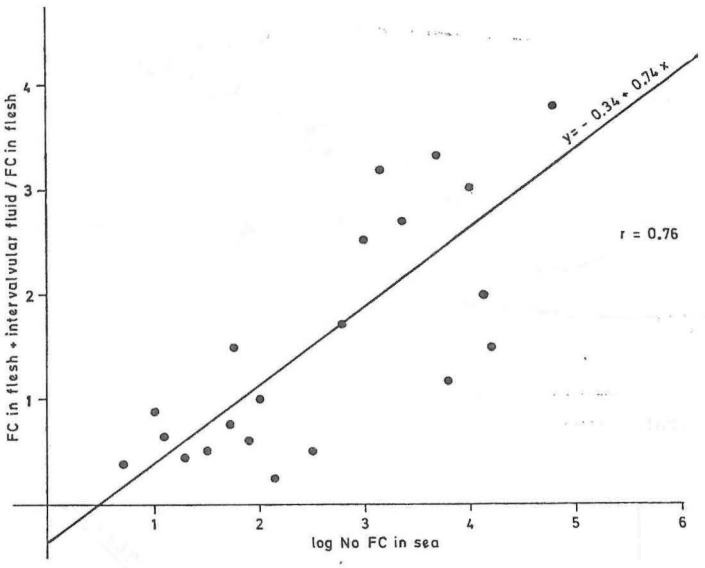

Fig. 3. Ratio of FC in flesh + intervalvular fluid/FC in flesh to FC concentrations in the sea

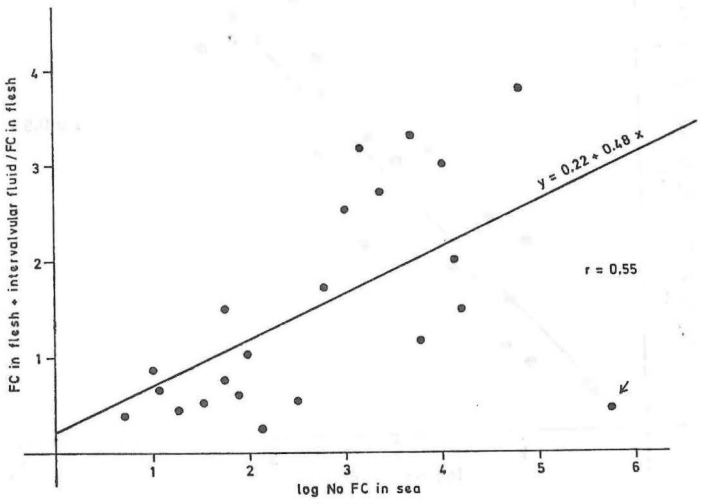

Fig. 4. Ratio of FC in flesh + intervalvular fluid/FC in flesh to FC concentrations in the sea

which it was not established with certainty whether it was a case of methodological error or of an actual short-term extremely high pollution level.

The same conclusions could be drawn from the analysis of the relationship between faecal coliform concentrations in flesh and that in growing water (Fig. 5) and the faecal coliform concentration in the flesh together with intervalvular fluid and growing water (Fig. 6). In the former case the correlation coefficient was 0.75 and in latter 0.80.

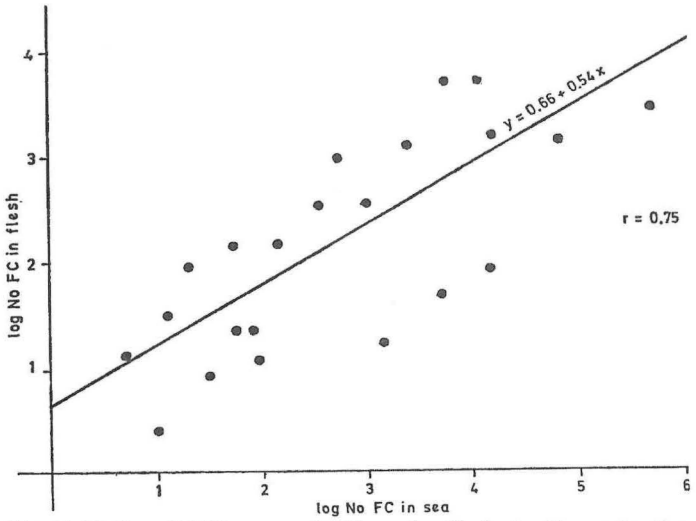

Fig. 5. Ratio of FC concentrations in flesh to those in the sea

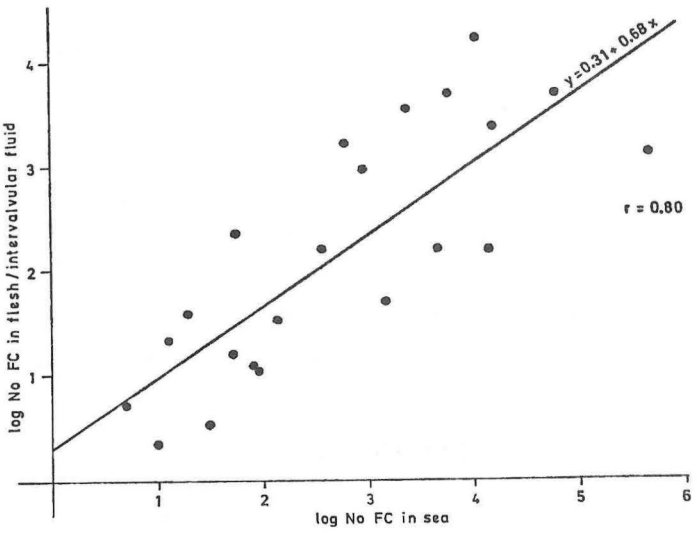

Fig. 6. Ratio of FC concentrations in flesh/intervalvular fluid to those in the sea

CONCLUSIONS

No essential difference in faecal coliform concentrations in shellfish flesh alone and those in flesh together with intervalvular fluid was established which leads to the conclusion that both methods are equally applicable.

However, we should like to recommend the flesh together with intervalvular fluid method for determination of faecal coliform concentrations from the following reasons:

— The coefficient of correlation with the growing water is slightly higher, particularly in more polluted areas;

— The method is simpler, as the flesh need not be separated from the intervalvular fluid;

— Both flesh and intervalvular fluid are normally consumed by man together. Analysis of both is therefore more directly correlated to consumption patterns.

ACKNOWLEDGEMENTS

The present study was partially supported by a research grant from the World Health Organization within the framework of the MED POL Phase II programme.

REFERENCES

UNEP/WHO. 1983. Determination of faecal coliforms in sea water by the membrane filtration culture method. Reference Methods for Marine Pollution Sudies. No. 3 Rev. 1, UNEP 1983.

UNEP/WHO. 1983. Determination of faecal coliforms in bivalves by multiple test tube method. Reference Methods for Marine Pollution studies No. 5 Rev. 1, UNEP. 1983.

Accepted: September 23, 1988

USPOREDNO ISPITIVANJE SADRŽAJA FEKALNIH KOLIFORMA U TKIVU ŠKOLJKI I TKIVU ZAJEDNO S TEKUĆINOM UNUTAR LJUŠTURA

Nada Krstulović i Mladen Šolić

Institut za oceanografiju i ribarstvo, Split Jugoslavija

KRATKI SADRŽAJ

Određivanje koncentracije fekalnih koliforma u školjkama *(Mytilus galloprovincialis)* vršeno je u samom tkivu školjki i u tkivu školjki zajedno s tekućinom koja se nalazi unutar ljuštura. Istovremeno je određivana i koncentracija

fekalnih koliforma u moru odakle su školjke sakupljane radi utvrđivanja odnosa zagađenja školjaka dobivenog različitim metodama sa sredinom u kojoj žive.

Ispitivanja su vršena u okviru Istraživačkih projekata za Mediteran (MED POL Phase II) a u svrhu utvrđivanja uporedivosti metoda.

Na osnovu statističke obrade svih podataka utvrđeno je da su obje metode jednako primjenjive i usporedive. Međutim metoda određivanja koncentracije fekalnih koliforma u školjkama korištenjem tkiva zajedno s tekućinom koja se nalazi unutar ljušture ima prednosti zbog kojih je preporučamo za daljnji rad. Naime, rezultati dobiveni ovom metodom su u nešto većoj korelaciji s okolnim morem, naročito u zagađenim sredinama. Metoda je jednostavnija jer nije potrebno odvajati tkivo školjki od tekućine koja se nalazi unutar ljuštura,a u ishrani se koristi tkivo školjki zajedno s tekućinom pa je rezultat dobiven ovom metodom u direktnijoj vezi s ishranom.