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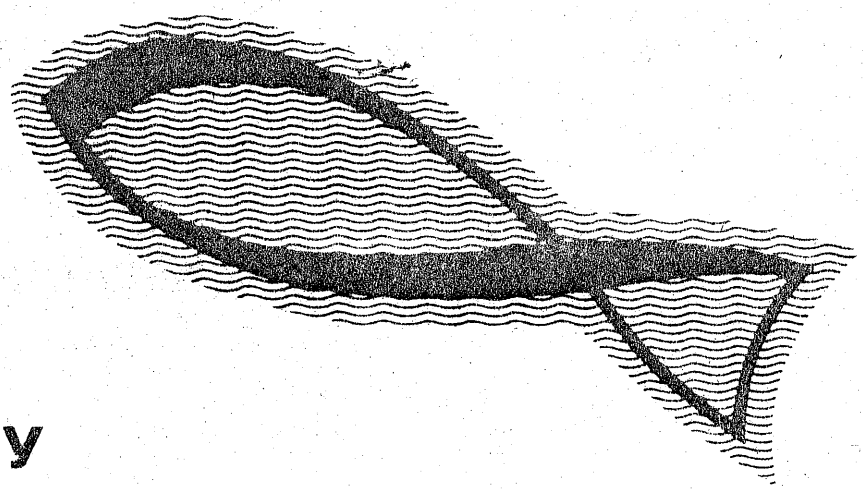
an roinn iascaigh agus foraoiseachta

The fat content of Irish herring



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The fat content in herrings determines the way in which these fish are presented for human consumption. For example, a high fat content is good for kippering, whilst low fat is suitable for marinating. The Department of Fisheries & Forestry has for many years provided the trade with the fat content data they require. The information is based on routine analyses of herring samples which are now made regularly at the Fisheries Research Centre. Sufficient data have been collected over the past ten years to prepare graphs of the mean monthly fat contents in our four main herring fisheries. These graphs (Figures 1 to 4) may be used to estimate when herring of a particular fat content will be available. This Leaflet presents the essential data and gives an explanation of the biological background of the changes in fat content.

Importance of Fat Content. In general most herrings caught by the Irish fleet are exported to Belgium, France, Germany (F.R.), the Netherlands or to the Scandinavian countries. Although a considerable amount of processing is now done in Ireland, most of our exported herring are finally processed abroad before being consumed there or re-exported. The fat content may be approximately classified into four groups: low fat (less than 8%), medium fat (8%-16%), high fat (16%-22%), and very high fat (more than 22%). The majority of Irish herring, until recently, were cured and barrelled for the Dutch market. However, in recent years, increasing amounts have been frozen, either whole or filleted, and the proportion now cured in the traditional manner has decreased. Quantities of herring are also spiced and cured either whole or having been gilled and gutted for special markets.

Further quantities are also smoked, canned or bottled, or marinated in various ways. Besides determining the most suitable type of process the fat content will also influence the way in which a certain process is carried out e.g. the strength of the pickle solution in curing.

Herring which have a high fat content and in which the gonads are either in the initial stages of development or are recovering after spawning are now known as "matjies". However the traditional and more correct definition of a matjie herring is one which has never spawned (i.e. a virgin herring) and in which the gonads have not yet developed. These herrings would therefore be usually slightly smaller than the herring now accepted as matjies. These matjie herring are considered to be prime quality, are only caught for a short period each year and consequently command the best prices.

Fat Content in relation to food and spawning. The fat content of herring is directly related to the availability of food and also to the time of spawning. Food, in the form of plankton, is at a minimum during winter and early spring, but rapidly increases during late spring and early summer and remains plentiful until late autumn, after which it declines. Fat content is also at a minimum during February and March but starts to increase when the herring start feeding. The increase continues until a peak is reached during July and August. Most of the herring stocks around Ireland spawn in autumn and prior to this the fish stop feeding. This, together with the rigours involved in spawning causes a drop in the fat content. However after spawning these fish will resume feeding for a short time and therefore the fat content increases again. Herrings that spawn in the winter - e.g. the winter spawning component of the Celtic Sea stock - because they do not cease feeding in October overwinter with a higher fat content than autumn spawners. Fat is initially stored in the muscles along the back and in the liver. Surplus amounts are deposited around the gut. During the winter and early spring, when no food is available, the herring live off these reserve food stores.

Methods of estimating fat content. There are numerous chemical methods available for estimating fat content from fish. These methods are either tedious or involve the use of complicated equipment and are not suitable for quick on the spot analyses. However, the moisture content is relatively easy to determine and for practical purposes the fat content is correlated with it. This allows fat content to be calculated from a measurement of the moisture content.

The moisture content is determined in the following manner. Fillets from six representative herrings are taken and surface moisture removed. The fillets are then minced in a domestic mincer. A sample of 10 grams is taken and dried using an X-15 Agat moisture tester and infra red lamp. The time taken to complete evaporation depends on the amount of moisture present but is usually less than an hour. A direct reading of moisture content is thus obtained. The fat content is estimated by substracting the moisture content from 80, since fat and moisture together constitute 80% of the body weight.

Results of analyses. The results are given for the following four areas:

	Area	Ports which provided samples
1.	Irish Sea	Howth
2.	Celtic Sea	Dunmore East, Cobh
3.	Southwest coast	Castletownbere, Dingle
4.	West and Northwest coasts	Killybegs, Burtonport, Dingle

These areas were selected because they have corresponded to our four main fisheries throughout most of the period under review (1970-1980) and the stocks from each area are considered as separate biological units. The values for fat content are the means of all samples examined since 1970 and are shown in Figures 1-4. In these figures the circles represent the average percentage fat content calculated on a twice monthly basis. The curves represent a guide to the probable monthly values during the year.

Irish Sea. The herring fishery in the Irish Sea takes place from mid-July to October and is based on a population which spawn from late September to early October. The samples examined only cover the period of the main fishery. The average fat content rises from 16% in early June to a maximum of 20 % in late July and subsequently gradually decreases until early October when it is approximately 13% during the spawning period. After spawning there is a slight increase, because food is still available but in late November it falls to 10%.

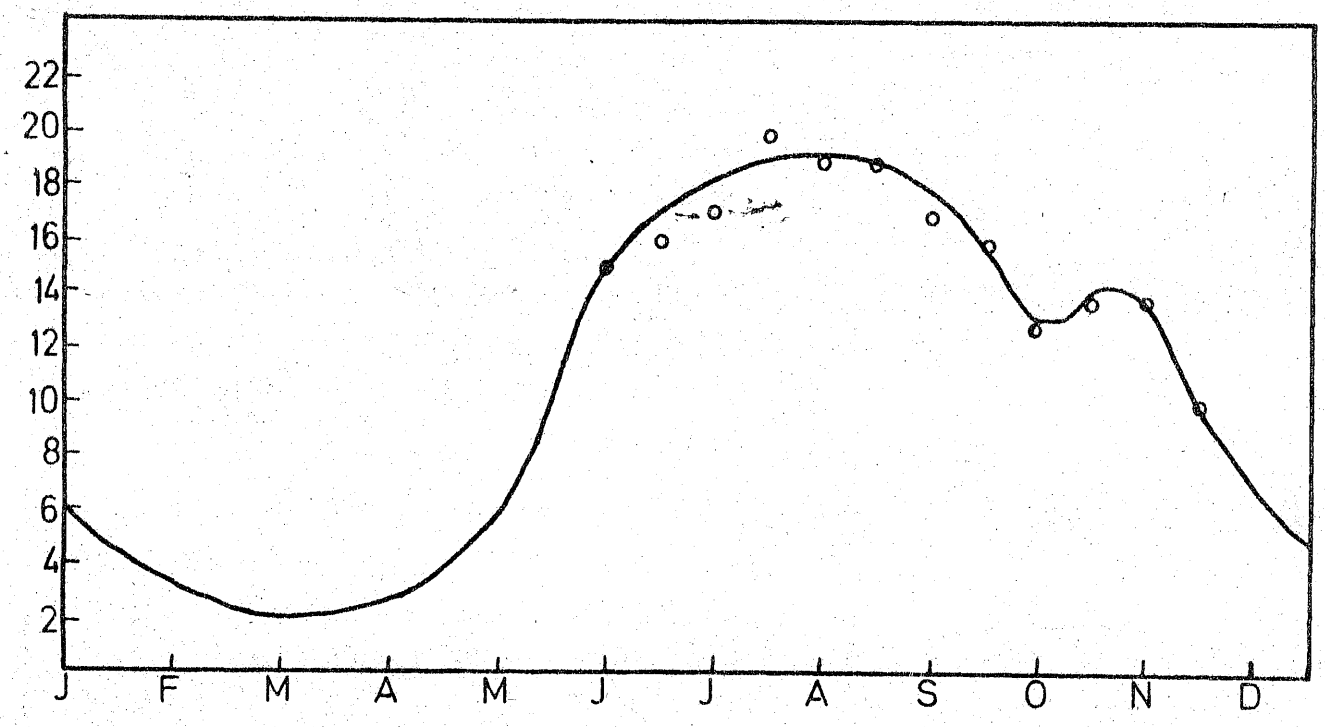

Fig1. IRISH SEA

Celtic Sea. The herring fishery in the Celtic Sea takes place when permitted by legislation from October to February and is based on a population which at present has two main spawning times: October and January. However the exact time of peak spawning is at present undergoing a change and the now important autumn spawning was not in evidence prior to 1974.

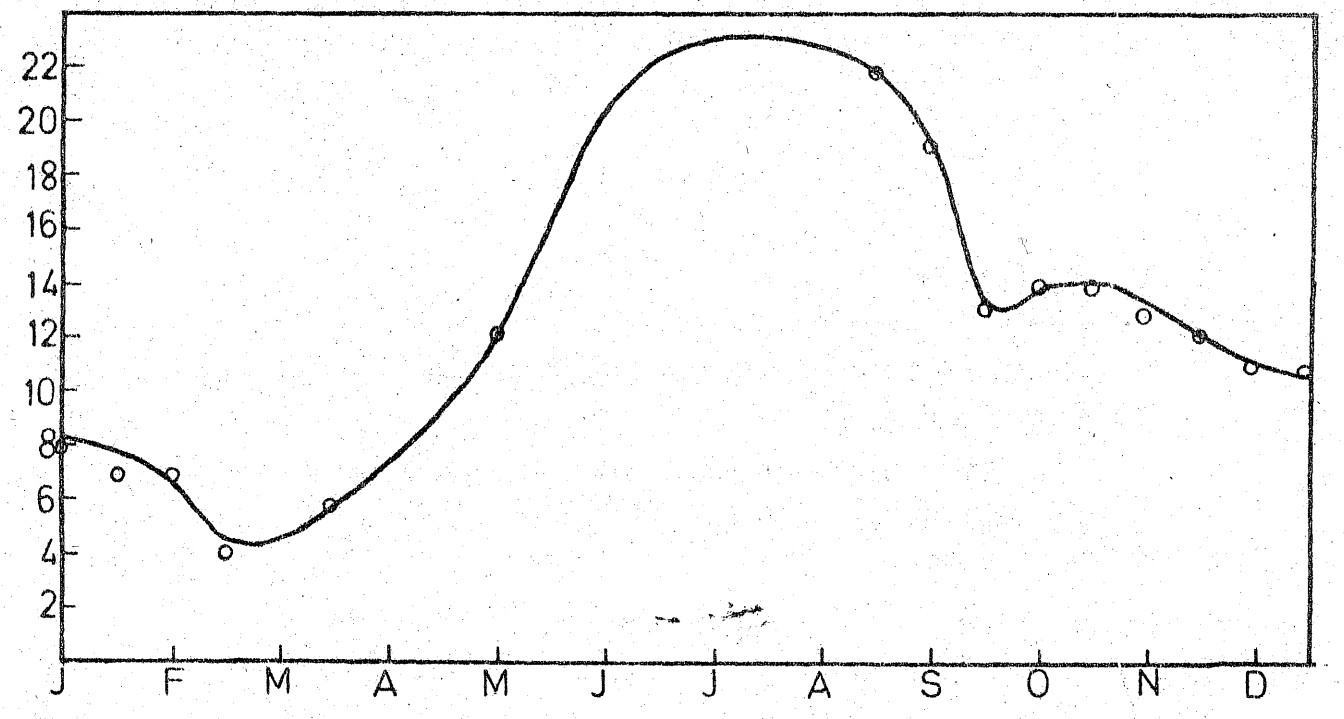

Fig 2. CELTIC SEA

Samples are available for the period mid August to February. The average fat content in late August is 22, which falls to about 13% in late September, and subsequently rises to 14% in October. This might suggest that spawning takes place in September, although this is not yet substantiated by the results of larval surveys conducted in the area. The average fat content decreases continuously during the winter and spring reaching a minimum of 4% in late February.

Southwest coast. The herring fishery on the southwest coast takes place mainly from August to October although in recent years substantial catches have been made in spring. Again the main population exploited is one which spawns in October. Samples are available throughout most of the year. These show that the average fat content is at a minimum of 3.5% during the period mid February to mid April - although during this period two exceptional samples were obtained with fat contents of 11% and 7%.

Fat content begins to increase in mid April and by June has reached 19%. Highest values appear to be in mid August after which they decline until the second half of September when they are about 13.5%. Spawning probably occurs at this stage, and this is followed by a slight increase to 14.5%. Following this the fat content continues to decrease during the winter when it averages about 10%.

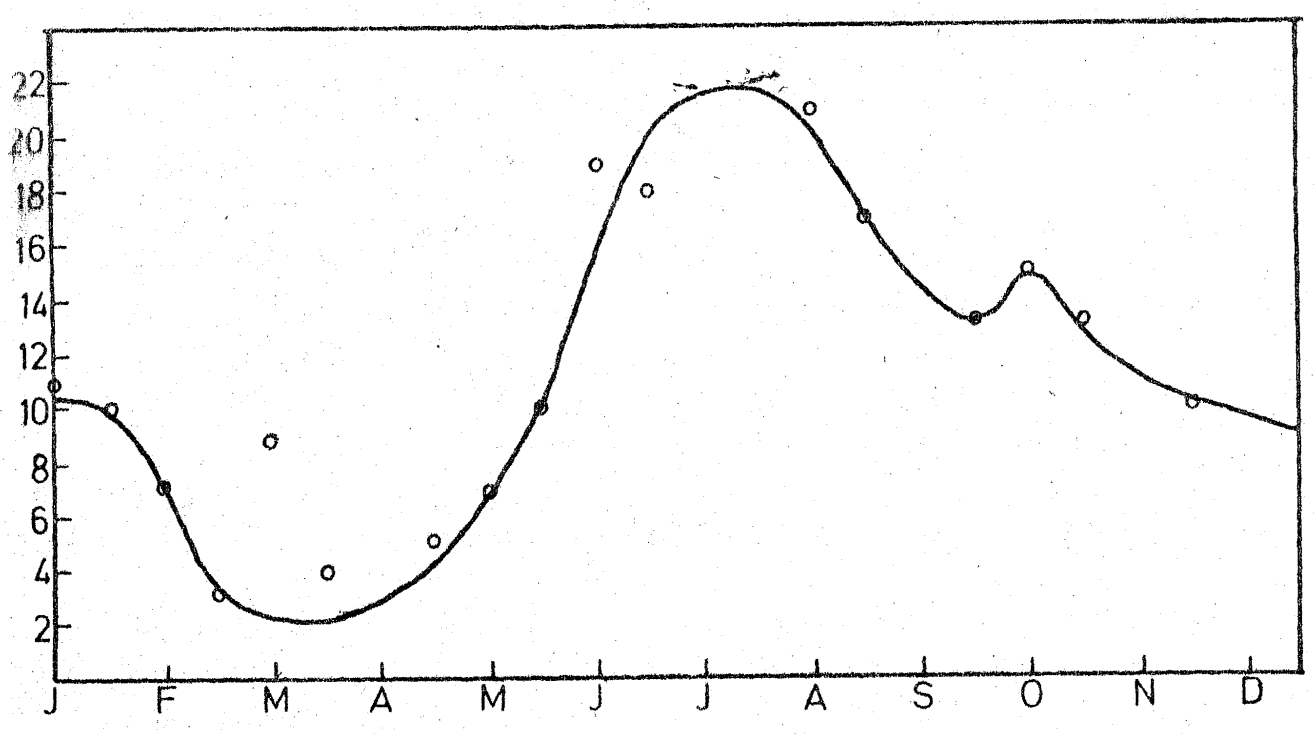

Fig.3 SOUTH WEST

West and Northwest coasts. Herrings are exploited throughout the year off the coasts of Donegal, Mayo and Galway. The main spawning takes place in October. Samples have been obtained throughout the year. The average fat content is at a minimum of 3% during late March and early April but subsequently increases, reaching a maximum of 19% during July and August. The usual autumnal decline then occurs, but it is moe pronounced than in the other areas, reaching 10% in early October. As usual there is a slight increase of about 1% after spawning. However, fat content decreases again during November, December and January to levels which are considerably lower than in the other areas off the Irish coast.

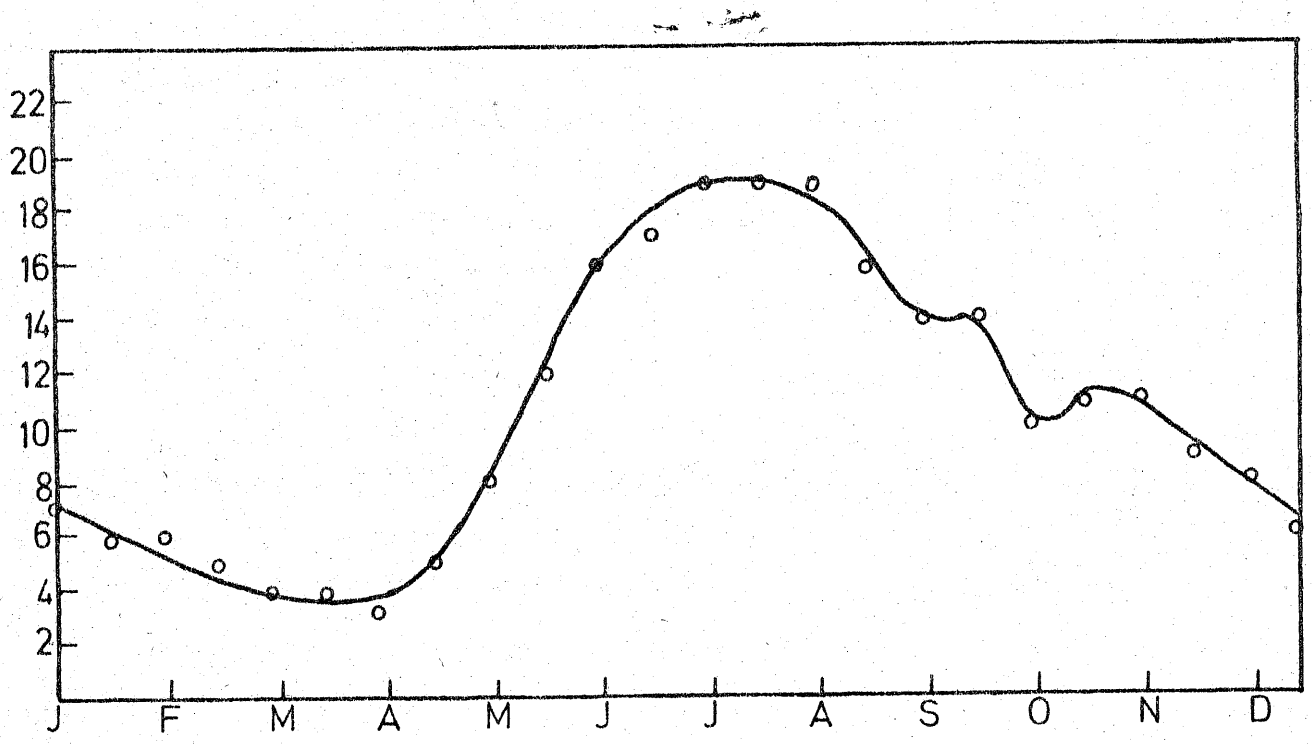

Fig 4. NORTH WEST