

Determination of Oil in Fish Meal *FatExtractor E-500 ECE: Determination of oil content in a fish meal sample by Twisselmann extraction according to AOCS Ba 3-38*

A simple and reliable procedure for the oil determination in a fish meal sample is introduced. This Application Note follows the official method AOCS Ba 3-38 by the American Oil Chemists' Society [1].

The standard method AOCS Ba 3-38 requires an extraction with a Butt-type extraction apparatus with an extraction time of 3h. The Butt-type extraction is equal to the Twisselmann extraction method used in the FatExtractor E-500 ECE. Both, the Butt-type extractor as well as the Economic Continuous Extraction (ECE) are continuous extractions where the sample is constantly kept in hot solvent vapor whilst efficiently rinsed with freshly distilled solvent. The oil content is determined gravimetrically after the extract has been dried to a constant weight.

1. Introduction

This Short Note shows by means of a certified reference material sample reliable and reproducible results will be received using the FatExtractor E-500 ECE (Figure 1).



Figure 1: FatExtractor E-500 ECE

In a second step this Short Note shows that an extraction time of 1 h is sufficient to receive reliable and reproducible results for the oil determination in a fish meal sample using the FatExtractor E-500 ECE.

2. Experimental

Equipment: FatExtractor E-500 Economic Continuous Extraction.

Sample: Fish meal, AOCS reference material 16 Fish Meal 2019-2020, sample 2, expected oil content: 9.56 % (limit of tolerance: 9.01 – 10.11 %).

Determination: 5 g of sample was weighed into a cellulose thimble. The accurate weight of the sample was noted. The sample in the cellulose thimble was covered with glass wool. The extraction was performed using the E-500 ECE applying the parameters specified in Table 1.

Table 1: Parameters for the Twisselmann Extraction with E-500 ECE

Step	Value	Heating level
Solvent	Petroleum ether	
Extraction	180 min	6
SmartDrying	on ¹	-
Solvent volume [mL]	70	

¹ Instead of using SmartDrying it is possible to use the following drying parameters. Then, SmartDrying is switched off: Petroleum ether: 12 min

The sample was extracted in triplicate. The extracts were dried to a constant weight in a drying oven at 102 °C, cooled down to ambient temperature in a desiccator, weighed and the oil content was calculated.

3. Results

The determined oil content of a fish meal sample is in good correlation to the certified reference value. The result is shown in Table 2.

Table 2: Oil content of seed meal samples, determined with FatExtractor E-500 ECE, n = 3.

	Oil content [%]
Mean value	9.82
Rsd	1.29

4. Method optimization

AOCS Ba 3-38 requires a Twisselmann extraction of 3 h. It is shown that the extraction time can be reduced to 1 h receiving reliable and reproducible results. A comparison of the results with 3 h and 1 h extraction time is shown in Figure 2.

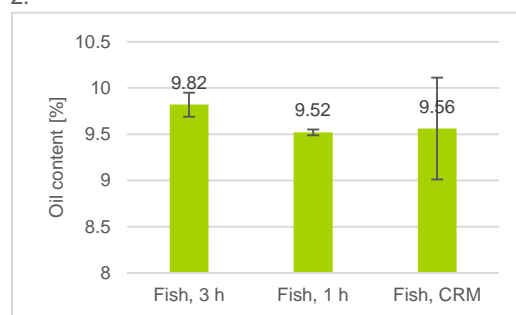


Figure 2: Comparison of oil contents in a fish meal sample determined with different extraction times using the E-500 ECE, expected oil content reference material 9.56 % +/-0.55%

5. Conclusion

The determination of the oil content in a fish meal sample following AOCS Ba 3-38 using the FatExtractor E-500 ECE provides reliable and reproducible results. The determined oil contents of the certified reference material sample correspond well to the declared value with low relatively standard deviations.

The AOCS method Ba 3-38 requires a continuous extraction of 3 h. This Short Note shows that the extraction time can be reduced to 1 h receiving reliable and reproducible results using the FatExtractor E-500 ECE.

6. References

[1] AOCS Official Method Ba 3-38: Oil in Seed Meals and Cakes, Revised 2017.

For more detailed information and safety considerations please refer to the Application Note No. 392/2020.