

Nitrogen & protein determination in feed

SpeedDigester K-439, Kjel Line and MultiDist

1. Introduction

An easy and reliable method for the determination of total nitrogen and protein in feed products according to the Kjeldahl method is introduced. The samples are digested using the SpeedDigester K-439. The steam distillation and the colorimetric titration in boric acid are performed with the MultiKjel in combination with a Metrohm Eco Titrator. This application note complies with official methods e.g. ISO 5983 [1] and AOAC 954.01 [2].

2. Experimental

Equipment: MultiKjel or MultiDist with titrator, for example Metrohm Eco Titrator

Procedure: A steam distillation protocol followed by a titration employing MultiKjel, coupled with Metrohm Eco Titrator applying the parameters specified in Table 1.

Table 1: Parameters for distillation and titration with the MultiKjel and Eco Titrator, respectively.

Method parameters MultiKjel		Instrument Settings	
Reaction Detection	Off	MaxAccuracy mode	On
H ₂ O Volume	60 mL	Chiller/Tap water	Chiller F-314
NaOH Volume	63 mL	Chiller temperature	10°C
Reaction Time	5 s	AutoDist mode	On
Steam Steps	Fixed time		
Steam Power	100 %	Automated Titration on Eco Titrator	
Level Detection	Off	Eco Titrator Method	
Distillation Time	180 s	Titrant	H ₂ SO ₄ 0.1 M
Stirrer Speed Distillation	5	Sensor type	Colorimetric
Titration Type	Boric acid titration	Volume increment	0.05 mL for blanks
H ₃ BO ₃ Volume	60 mL (4%)	Titration rate	Fast for samples
Stirrer Speed Titration	8	Stop EP	1
Titration Start Time	180 s	Volume after EP	0.7 mL
Sample Tube Aspiration	30s	EP Criterion	20 mV
Receiver Aspiration	30s		



3. Results

The results of the determination of nitrogen and protein contents in animal feed products are presented in Table 2.

Table 2: Results of the determination of nitrogen and protein in animal feed with BUCHI ready to use 4% boric acid with Sher indicator (11064973).

Sample	m _{Sample} [g]	V _{Sample} [mL]	%N	%P	Mean values	Certified range [%]
Green meal pellets	0.4578	11.6310	3.34	20.89	20.73 rsd : 0.93%	19.4 - 21.2
	0.4644	11.5904	3.28	20.51		
	0.4776	12.0425	3.32	20.78		
Complete feed for turkeys	0.4605	14.0785	4.07	25.41	25.33 rsd : 0.51%	23.6 - 25.7
	0.4709	14.3757	4.06	25.40		
	0.4515	13.6995	4.03	25.18		

4. Conclusion

The determination of nitrogen and protein in animal feed products using the SpeedDigester K-439 and Kjel Line systems with colorimetric titration provides reliable and reproducible results. These results correspond well to the certified reference values with low relative standard deviations.

5. References

- [1] ISO 5983 Animal feeding stuffs — Determination of nitrogen content and calculation of crude protein content
 - [2] AOAC 954.01 Animal feeding stuffs — Determination of nitrogen content and calculation of crude protein content
- For more information, please refer to Application Note 821/2023.