



# Wet Pet Food Moisture Study

*Karl Fischer Titration and LOD methods*

AAFCO Laboratory Committee Meeting

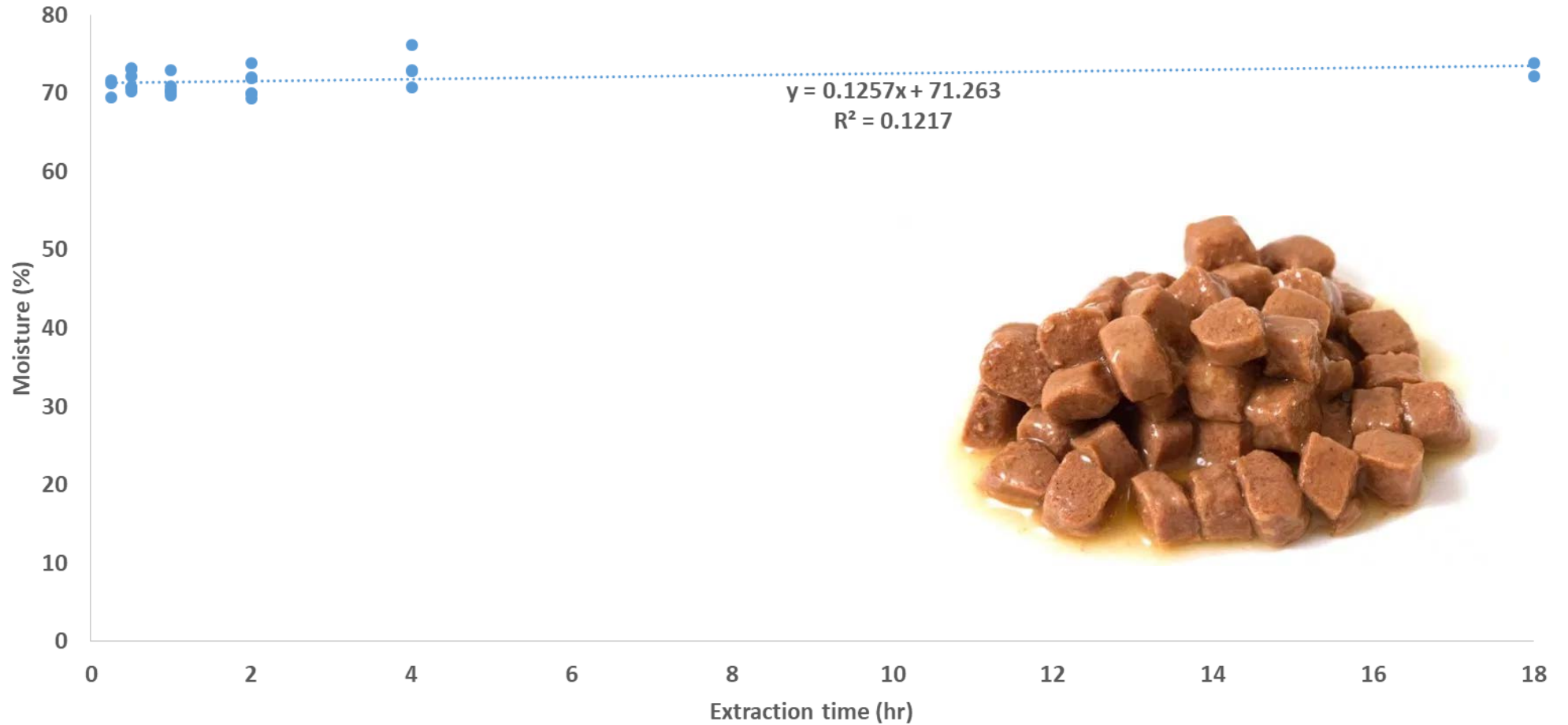
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AOAC 991.02 Titration by time	
Time (hr)	Moisture (%)
0.3	69.4
0.3	71.6
0.3	71.3
0.5	70.8
0.5	73.3
0.5	72.1
0.5	70.2
0.5	73.1
0.5	70.8
1.0	70.4
1.0	70.9
1.0	70.3
1.0	70.3
1.0	72.9
1.0	69.8
2.0	73.9
2.0	72.0
2.0	72.1
2.0	69.4
2.0	70.0
2.0	69.9
4.0	76.2
4.0	70.8
4.0	72.9
4.0	72.9
18.0	72.2
18.0	73.9

### AOAC 991.02 (KF for semi-moist pet treats) Titration by time





**TABLE 1: Titration of sample size in AOAC 991.02**



Test portion (g)	N	Mean Moisture (%)
1	3	<b>76.6<sup>a</sup></b>
2	3	<b>72.2<sup>b</sup></b>
4	3	<b>70.8<sup>b</sup></b>



\*Levels not connected by the same letter are significantly different ( $p > 0.05$ )

N represents triplicate reps of same sample.



**TABLE 2: Moisture in Wet Dog Food Determined by Titration (Karl Fischer) and Loss-on-Drying (LOD) Oven Methods**

Method Number	Official Name	Temp (°C)	Time (hr)	Equipment/Procedure	N*	Mean Moisture (%)	Relative Recovery (%)
AOAC 991.02	Moisture in Semi-Moist Pet Treats (KF)	RT	0.25	Methanol Extraction <b>1 g ***</b>	3	<b>79.07<sup>a**</sup></b>	<b>100</b>
AOAC 991.02	Moisture in Semi-Moist Pet Treats (KF)	RT	0.25	Methanol Extraction <b>0.5 g</b>	3	<b>76.97<sup>ab</sup></b>	<b>97</b>
AOAC 991.02	Moisture in Semi-Moist Pet Treats (KF)	RT	0.25	Methanol Extraction <b>2 g</b>	3	<b>75.83<sup>ab</sup></b>	<b>96</b>
ASTM D6869-03	Moisture in Plastics (KF)	130	var	Vaporized into N carrier gas	3	<b>74.55<sup>ab</sup></b>	<b>94</b>
AOAC 945.15	LOD in Malt	104	3	Convection Oven	3	<b>73.88<sup>b</sup></b>	<b>93</b>
AOAC 930.15	LOD for Feeds	135	2	Convection Oven	3	<b>73.67<sup>b</sup></b>	<b>93</b>

\*N represent 3 reps of the same sample

\*\*Levels not connected by the same letter are significantly different (p > 0.05)

\*\*\*AOAC 991.02 titrates for moisture in soft-moist and semi-moist pet foods containing 20-30% moisture and other volatile materials. This methods recommends 8-10 g test portion size run for 15 minutes.

RT = room temperature





**TABLE 3: Moisture in Wet Cat Food Determined by Titration (Karl Fischer) and Loss-on-Drying (LOD) Oven Methods**

Method Number	Official Name	Temp (°C)	Time (hr)	Equipment/Procedure	N*	Mean Moisture (%)	Relative Recovery (%)
AOAC 991.02	Moisture in Semi-Moist Pet Treats (KF)	RT	0.25	Methanol Extraction <b>1 g ***</b>	3	<b>80.97<sup>a**</sup></b>	<b>100</b>
AOAC 991.02	Moisture in Semi-Moist Pet Treats (KF)	RT	0.25	Methanol Extraction <b>0.5 g</b>	3	<b>80.57<sup>a</sup></b>	<b>99.5</b>
ASTM D6869-03	Moisture in Plastics (KF)	130	var	Vaporized into N carrier gas	3	<b>78.16<sup>ab</sup></b>	<b>96</b>
AOAC 991.02	Moisture in Semi-Moist Pet Treats (KF)	RT	0.25	Methanol Extraction <b>2 g</b>	3	<b>77.63<sup>ab</sup></b>	<b>96</b>
AOAC 945.15	LOD in Malt	104	3	Convection Oven	3	<b>77.02<sup>b</sup></b>	<b>95</b>
AOAC 930.15	LOD for Feeds	135	2	Convection Oven	3	<b>76.60<sup>b</sup></b>	<b>95</b>

\*N represent 3 reps of the same sample

\*\*Levels not connected by the same letter are significantly different (p > 0.05)

\*\*\*AOAC 991.02 titrates for moisture in soft-moist and semi-moist pet foods containing 20-30% moisture and other volatile materials. This methods recommends 8-10 g test portion size run for 15 minutes.

RT = room temperature





**TABLE 4: Moisture in Wet Pet Food Determined by Titration (Karl Fischer) and Loss-on-Drying (LOD) Oven Methods**

Method Number	Official Name	Temp (°C)	Time (hr)	Equipment/Procedure	N*	Mean Moisture (%)	Relative Recovery (%)
NFTA 2.2.1.1/2.1.4	LOD for Forages, Silage, Wet Feeds (Two-step method)	55 (105)	ON (3)	Convection Ovens	20	<b>76.64<sup>a**</sup></b>	<b>100</b>
AOAC 991.02	Moisture in Semi-Moist Pet Treats (Two-step method)	55 (RT)	ON (0.25)	Convection Oven Methanol Extraction Titration (Karl Fischer)	20	<b>76.54<sup>a</sup></b>	<b>100</b>
AOAC 945.15	LOD in Malt	104	3	Convection Oven	20	<b>75.39<sup>a</sup></b>	<b>98</b>
AOAC 950.46 B(b)	LOD in Meat	125	4	Convection Oven	20	<b>75.37<sup>a</sup></b>	<b>98</b>
AOAC 930.15	LOD for Feeds	135	2	Convection Oven	20	<b>75.35<sup>a</sup></b>	<b>98</b>
AOAC 991.02***	Moisture in Semi-Moist Pet Treats	RT	0.25	Methanol Extraction Titration (Karl Fischer)	20	<b>71.76<sup>b</sup></b>	<b>94</b>

\*N represent 20 different wet pet food samples.

\*\*Levels not connected by the same letter are significantly different (p > 0.05).

\*\*\*AOAC 991.02 titrates for moisture in soft-moist and semi-moist pet foods containing 20-30% moisture and other volatile materials. This methods recommends 8-10 g test portion size run for 15 minutes.

RT = room temperature



# Summary: Other KF method

- ASTM D6869-03, a rapid Karl Fischer method, was not significantly different from AOAC 991.02 when performed at 0.5, 1 or 2 g test portions.
- ASTM D6869-03 was not significantly different from LOD methods AOAC 930.15 & AOAC 945.15.



# Summary: Two-step LODs

- Two-step drying methods give similar moisture results to the optimized AOAC 991.02 method but have a 2-day rather than 1-day turn-around-time.
- Two-step drying methods were not significantly different from LOD methods in 104, 125 or 135<sup>0</sup>C convection ovens.







# Thank You

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