Performance Calibration Module Aquafeed

Finished Feed for following Aqua Species:

Aqua Feed	Sea Water	Fresh Water

Measurable Parameters	
Parameter	**Range**
Moisture [%]	0 – 15
Crude Protein [%]	15 – 66
Fat (ether extract) [%]	0 – 40
Starch [%]	0 – 44
Fat (Acid Hydrolysis) [%]	0 – 43
Crude Fibre [%]	0 – 6
Ash [%]	4 – 18

All values are given on „as fed" basis.

Sample preparation:

1. Take a representative sample of the feed you want to measure.
2. Grind it for a total of 30 seconds (3 x 10 seconds) with an electric grinder.
3. Finely ground samples are extremely important. The more homogenous the sample is, the less deviations you will have between measurements!

Sample measurement:

1. Place your ground sample in a container.
2. Scan the sample 5 times at different spots. Slowly move the spectrometer over the sample during each scan. After the 5th measurement the result is displayed on your phone.

Performance Calibration Module Ruminants

Finished Feed for following ruminants:

Ruminants	Beef	Sheep	Calf	Dairy	Dairy Blends	Lamb	Goat

Measurable Parameters	
Parameter	**Range**
Moisture [%]	3 – 18
Crude Protein [%]	5 – 50
Fat (ether extract) [%]	0 – 17
Starch [%]	0 – 52
Sugar [%]	0 – 13
Crude Fibre [%]	0 – 21
Fat (acid hydrolysis) [%]	0 – 16
NDF [%]	0 – 31
ADF [%]	0 – 16
Ash [%]	0 – 25
DE [MJ/kg]	14 – 20
ME [MJ/kg]	12 – 19
NEL for dairy [MJ/kg]	8 – 12

All values are given on „as fed" basis. We use equations from the *National Research Council* to predict energies.

Sample preparation:

1. Take a representative sample of the feed you want to measure.
2. Grind it for a total of 30 seconds (3 x 10 seconds) with an electric grinder.
3. Finely ground samples are extremely important. The more homogenous the sample is, the less deviations you will have between measurements!

Sample measurement:

1. Place your ground sample in a container.
2. Scan the sample 5 times at different spots. Slowly move the spectrometer over the sample during each scan. After the 5th measurement the result is displayed on your phone.

Performance Calibration Module Swine

Finished Feed for following swine types:

| Swine | Finisher Pig | Gestation Sow | Grower Pig | Piglet |

Measurable Parameters	
Parameter	**Range**
Moisture [%]	3 – 19
Crude Protein [%]	7 – 49
Fat (ether extract) [%]	0 – 17
Starch [%]	5 – 54
Sugar [%]	2 – 9
Crude Fibre [%]	0 – 15
Fat (acid hydrolysis) [%]	0 – 18
NDF [%]	6 – 27
ADF [%]	2 – 15
Ash [%]	0 – 23
GE [MJ/kg]	15 – 22
DE [MJ/kg]	7 – 20
ME [MJ/kg]	7 – 19
NE [MJ/kg]	10 – 13

All values are given on „as fed" basis. We use equations from the *National Research Council* to predict energies.

Sample preparation:

1. Take a representative sample of the feed you want to measure.
2. Grind it for a total of 30 seconds (3 x 10 seconds) with an electric grinder.
3. Finely ground samples are extremely important. The more homogenous the sample is, the less deviations you will have between measurements!

Sample measurement:

1. Place your ground sample in a container.
2. Scan the sample 5 times at different spots. Slowly move the spectrometer over the sample during each scan. After the 5th measurement the result is displayed on your phone.

Performance Calibration Module
Poultry

Finished Feed for following poultry types:

Poultry	Broiler	Chick	Duck	Game	Goose	Layers	Ostrich	Turkey

Measurable Parameter	
Parameter	**Range**
Moisture [%]	4 – 18
Crude Protein [%]	7 – 47
Fat (ether extract) [%]	0 – 16
Starch [%]	1 – 65
Sugar [%]	0 – 9
Crude Fibre [%]	0 – 16
Fat (acid hydrolysis) [%]	0 – 16
NDF [%]	3 – 28
ADF [%]	2 – 13
Ash [%]	0 – 35
AMEn [MJ/kg]	11 – 15

All values are given on „as fed" basis. We use equations from the *National Research Council* to predict energies.

Sample preparation:

1. Take a representative sample of the feed you want to measure.
2. Grind it for a total of 30 seconds (3 x 10 seconds) with an electric grinder.
3. Finely ground samples are extremely important. The more homogenous the sample is, the less deviations you will have between measurements!

Sample measurement:

1. Place your ground sample in a container.
2. Scan the sample 5 times at different spots. Slowly move the spectrometer over the sample during each scan. After the 5th measurement the result is displayed on your phone.

Performance Calibration Module
Animal Protein

For following animal protein types:

| Animal Protein | Bone Meal | Blood and Plasma[1] | Feather Meal[1] | Fish Meal[1] | Meat and Bone Meal[1] | Poultry bypro-duct |

Measurable ParametersAA	
Parameter	**Range**
Moisture [%]	0 – 16
Crude Protein [%]	18 – 100
Amino Acids[1]	calculated
Fat (ether extract) [%]	0 – 32
Crude Fibre [%]	0 – 4
Fat (Acid Hydrolysis) [%]	0 – 35
Ash	0 – 61

1 | Amino Acids are only available for sample types marked with [1]

All values are given on „as fed" basis. The calculation of the Amino Acids is based on the Nutritional Table of Wageningen, Sauvant et al, 2004.

Sample preparation:

1. Take a representative sample of the feed you want to measure.
2. Grind it for a total of 30 seconds (3 x 10 seconds) with an electric grinder.
3. Finely ground samples are extremely important. The more homogenous the sample is, the less deviations you will have between measurements!

Sample measurement:

1. Place your ground sample in a container.
2. Scan the sample 5 times at different spots. Slowly move the spectrometer over the sample during each scan. After the 5th measurement the result is displayed on your phone.

Performance Calibration Module
Cereals

For following cereal types:

Cereals	Barley[1]	Corn[1]	Oats[1]	Triticale[1]	Wheat[1]	Sorghum[1]	Rye[1]
	Rice[1]						

Measurable Parameters	
Parameter	**Range**
Moisture [%]	4 – 22
Crude Protein [%]	4 – 22
Amino Acids[1]	calculated
Fat (ether extract) [%]	0 – 14
Starch [%]	26 – 82
Sugar [%]	0 – 9
Crude Fibre [%]	0 – 12
Fat (acid hydrolysis) [%]	0 – 14
NDF [%]	1 – 27
ADF [%]	1 – 12
Ash [%]	0 – 6
AMEn [MJ/kg]	12 – 17

1 | Amino Acids are only available for sample types marked with [1]

All values are given on „as fed" basis. The calculation of the Amino Acids is based on the
[Nutritional Table of Wageningen](), Sauvant et al, 2004.
We use equations from the *European Community* to predict energies.

Sample preparation:

1. Take a representative sample of the feed you want to measure.
2. Grind it for a total of 30 seconds (3 x 10 seconds) with an electric grinder.
3. Finely ground samples are extremely important. The more homogenous the sample is,
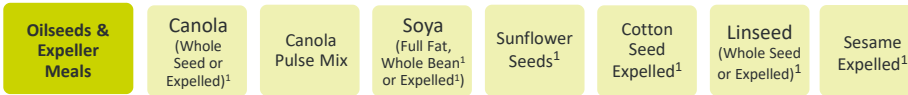   the less deviations you will have between measurements!

Sample measurement:

1. Place your ground sample in a container.
2. Scan the sample 5 times at different spots. Slowly move the spectrometer over
   the sample during each scan. After the 5th measurement the result is displayed on your
   phone.

Performance Calibration Module
Oilseeds & Expeller Meals

For following oilseed and expeller meal types:

| Oilseeds & Expeller Meals | Canola (Whole Seed or Expelled)[1] | Canola Pulse Mix | Soya (Full Fat, Whole Bean[1] or Expelled[1]) | Sunflower Seeds[1] | Cotton Seed Expelled[1] | Linseed (Whole Seed or Expelled)[1] | Sesame Expelled[1] |

Measurable Parameters	
Parameter	**Range**
Moisture [%]	0 – 18
Crude Protein [%]	6 – 52
Amino Acids[1]	calculated
Fat (ether extract) [%]	0 – 62
Starch [%]	0 – 31
Sugar [%]	0 – 18
Crude Fibre [%]	0 – 35
Fat (acid hydrolysis) [%]	3 – 64
NDF [%]	1 – 34
ADF [%]	2 – 24
Ash [%]	0 – 21

1 | Amino Acids are only available for sample types marked with [1]

All values are given on „as fed" basis. The calculation of the Amino Acids is based on the [Nutritional Table of Wageningen](#), Sauvant et al, 2004.

Sample preparation:

1. Take a representative sample of the feed you want to measure.
2. Grind it for a total of 30 seconds (3 x 10 seconds) with an electric grinder.
3. Finely ground samples are extremely important. The more homogenous the sample is, the less deviations you will have between measurements!

Sample measurement:

1. Place your ground sample in a container.
2. Scan the sample 5 times at different spots. Slowly move the spectrometer over the sample during each scan. After the 5th measurement the result is displayed on your phone.

Performance Calibration Module Extraction Meals

For following extraction meal types:

Extraction Meals	Canola Extracted	Corn Gluten 60%[1]	Cotton Extracted	Groundnut Extracted[1]	Linseed Extracted[1]	Malt Residue[1]	Soya Extracted	Sunflower Oilcake Extracted[1]	Sesame Extract	Distiller Grains (High Protein)[1]

Measurable Parameters	
Parameter	**Range**
Moisture [%]	2 – 18
Crude Protein [%]	15 – 73
Amino Acids[1]	calculated
Fat (ether extract) [%]	0 – 17
Starch [%]	0 – 31
Sugar [%]	0 – 30
Crude Fibre [%]	0 – 37
Fat (acid hydrolysis) [%]	0 – 19
NDF [%]	0 – 46
ADF [%]	0 – 28
Ash [%]	0 – 29

1 | Amino Acids are only available for sample types marked with [1]

All values are given on „as fed" basis. The calculation of the Amino Acids is based on the Nutritional Table of Wageningen, Sauvant et al, 2004.

Sample preparation:

1. Take a representative sample of the feed you want to measure.
2. Grind it for a total of 30 seconds (3 x 10 seconds) with an electric grinder.
3. Finely ground samples are extremely important. The more homogenous the sample is, the less deviations you will have between measurements!

Sample measurement:

1. Place your ground sample in a container.
2. Scan the sample 5 times at different spots. Slowly move the spectrometer over the sample during each scan. After the 5th measurement the result is displayed on your phone.

Performance Calibration Module Byproducts

For following byproduct types:

Bypro-ducts	Barley Bran[1]	Buiscuit Meal	Cassava[1]	Citrus[1]	Cocoa[1]	Copra	Copra Extracted[1]	Corn Bran	Corn Germ Meal
	Corn Gluten 20%[1]	Corn Gluten Feed[1]	Distillers Grains (Low Protein)[1]	Grain Screenings	Grass Meal[1]	Hominy[1]	Locust Bean	Oat Feed	
	Oat Flour	Palm Kernel Low Oil[1]	Potato Products[1]	Rice Bran Extracted[1]	Shea Nut Meal	Soya Hulls[1]	Sugar Beet[1]	Wheat Bran[1]	Wheat Middlings[1]

Measurable Parameters	
Parameter	**Range**
Moisture [%]	1 – 18
Crude Protein [%]	0 – 39
Amino Acids[1]	calculated
Fat (Ether Extract) [%]	0 – 13
Starch [%]	0 – 86
Sugar [%]	0 – 18
Crude Fibre [%]	0 – 37
Fat (Acid Hydrolysis) [%]	0 – 17
NDF [%]	4 – 44
ADF [%]	0 – 17
Ash [%]	0 – 17

1 | Amino Acids are only available for sample types marked with [1]

All values are given on „as fed" basis. The calculation of the Amino Acids is based on the Nutritional Table of Wageningen, Sauvant et al, 2004.

Sample preparation:

1. Take a representative sample of the feed you want to measure.
2. Grind it for a total of 30 seconds (3 x 10 seconds) with an electric grinder.
3. Finely ground samples are extremely important. The more homogenous the sample is, the less deviations you will have between measurements!

Sample measurement:

1. Place your ground sample in a container.
2. Scan the sample 5 times at different spots. Slowly move the spectrometer over the sample during each scan. After the 5th measurement the result is displayed on your phone.

Performance Calibration Module
Grain Silage

For following grain silage types:

| **Grain Silage** | Whole Crop Silage | Maize/Corn Silage |

Measurable Parameters	
Parameter	**Range**
Dry Matter [%]	15 – 71
Crude Protein [%]	6 – 24
D-Value [%]	49 – 81
NDF [%]	31 – 72
ADF [%]	22 – 49
Fat (Ether extracted) [%]	1 – 5
Ash [%]	3 – 10
Starch	2 – 55
DE [MJ/kg]	Calculated
ME [MJ/kg]	Calculated
NEL for dairy [MJ/kg]	Calculated

All values are given on dry matter basis. We use equations from the *National Research Council* to predict energies.

Sample preparation:

1. No preparation is necessary. The samples must be measured as is, without drying and grinding.
2. Take a sample from different spots of the silage, grass or hay, mix it and place it in a container or bowl. In case of a silage bunker, do not measure directly on the silage surface. Remove the first 5 cm of the surface and take samples at different spots, mix them and place them in a container or bowl .

Sample measurement:

1. Make sure the glass of the measuring head of the spectrometer is clean. Put the measuring head in direct contact with the sample.
2. Scan the sample 10 times at different spots. Slowly move the spectrometer over the sample during each scan. After the 10th measurement, the result is displayed on your phone.

Performance Calibration Module
Grass Silage

Silage / Fermented	Grass Silage

Measurable parameters	
Parameter	**Range**
Dry Matter [%]	10 – 77
Crude Protein [%]	6 – 32
D-Value [%]	46 – 80
NDF [%]	32 – 80
ADF [%]	22 – 49
Fat (Ether extracted)[%]	2 – 5
Ash [%]	4 – 11
WSC	0 – 20
DE [MJ/kg]	Calculated
ME [MJ/kg]	Calculated
NEL for dairy [MJ/kg]	Calculated

All values are given on dry matter basis. We use equations from the *National Research Council* to predict energies.

Sample preparation:

1. No preparation is necessary. The samples must be measured as is, without drying and grinding.
2. Take a sample from different spots of the silage, grass or hay, mix it and place it in a container or bowl. In case of a silage bunker, do not measure directly on the silage surface. Remove the first 5 cm of the surface and take samples at different spots, mix them and place them in a container or bowl .

Sample measurement:

1. Make sure the glass of the measuring head of the spectrometer is clean. Put the measuring head in direct contact with the sample.
2. Scan the sample 10 times at different spots. Slowly move the spectrometer over the sample during each scan. After the 10th measurement, the result is displayed on your phone.

Performance Calibration Module
Hay

Fresh Forage / Non-Fermented

Hay

Measurable parameters	
Parameter	**Range**
Dry Matter [%]	55 – 96
Crude Protein [%]	2 – 25
WSC [%]	0 – 17
ADF	24 – 57
NDF	49 – 85
Fat (Ether Extract)	1 – 6
D-Value	43 – 78
Ash	3 – 19
DE [MJ/kg]	Calculated
ME [MJ/kg]	Calculated
NEL [MJ/kg]	Calculated

All values are given on dry matter basis. We use equations from the *National Research Council* to predict energies.

Sample preparation:

1. No preparation is necessary. The samples must be measured as is, without drying and grinding.
2. Take a sample from different spots of the silage, grass or hay, mix it and place it in a container or bowl. In case of a silage bunker, do not measure directly on the silage surface. Remove the first 5 cm of the surface and take samples at different spots, mix them and place them in a container or bowl .

Sample measurement:

1. Make sure the glass of the measuring head of the spectrometer is clean. Put the measuring head in direct contact with the sample.
2. Scan the sample 10 times at different spots. Slowly move the spectrometer over the sample during each scan. After the 10th measurement, the result is displayed on your phone.

Performance Calibration Module
Fresh Grass

Fresh Forage / Non-Fermented	Fresh Grass

Measurable parameters	
Parameter	**Range**
Dry Matter [%]	13 – 68
Crude Protein [%]	7 – 24
Water Soluble Carbohydrates	0 – 9
ADF	21 – 38
NDF	39 – 64
Fat (Ether Extracted)	2 – 6
D-Value	51 – 84
Ash	4 – 12
DE [MJ/kg]	Calculated
ME [MJ/kg]	Calculated
NEL [MJ/kg]	Calculated

All values are given on dry matter basis. We use equations from the *National Research Council* to predict energies.

Sample preparation:

1. No preparation is necessary. The samples must be measured as is, without drying and grinding.
2. Take a sample from different spots of the silage, grass or hay, mix it and place it in a container or bowl. In case of a silage bunker, do not measure directly on the silage surface. Remove the first 5 cm of the surface and take samples at different spots, mix them and place them in a container or bowl .

Sample measurement:

1. Make sure the glass of the measuring head of the spectrometer is clean. Put the measuring head in direct contact with the sample.
2. Scan the sample 10 times at different spots. Slowly move the spectrometer over the sample during each scan. After the 10th measurement, the result is displayed on your phone.