

## NIR-Online Multipoint System solution in feed industry

Feed millers are required to produce safe and high quality feed with well defined nutritional content to meet quality specifications, and minimize operating costs to increase the margin.

Real-time control of the entire process by monitoring key parameters such as protein, fat, moisture, crude fibre is therefore critical to take immediate decisions and in-process adjustments.

The BUCHI NIR-Online® Multipoint System solution spans across the entire feed production chain (from incoming raw material inspection, production to storage and out-loading of the finished product) and provides continuous multi-parameter measurements in a fast, simple and reliable way.

### 1. Introduction

Real-time control of the entire feed production process from the raw material intake, milling, mixing, and pelletizing steps to finished product storage and out-loading brings several benefits. This includes fair price for the incoming raw material, rejection of out-of-specification material, easy production planning according to the raw material composition, immediate process corrections minimizing expensive waste or rework, correct labelling and product specifications.

During the production chain, measurement of key parameters such as moisture, fat, protein, crude fibre is essential to guarantee maximum production efficiency and profitability.

These determinations are generally performed using conventional chemical methods, which are tedious, off-line, destructive, and time consuming [1-3].

The implementation of the BUCHI NIR-Online® Multipoint System provides the most cost-effective way to monitor the complete process chain with several check points (Fig.1). Within seconds, simultaneous multiple parameters are continuously and accurately measured.

This application note reports the BUCHI NIR-Online® Multipoint System performance in feed industry.

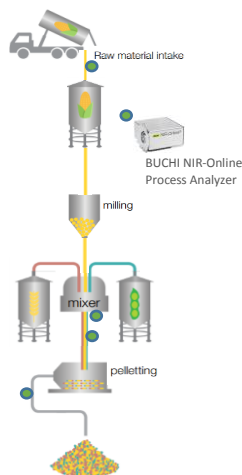


Figure 1. Feed milling process.

### 2. Measurement principle

Wavelength range: 900-1700 nm

Measurement principle: Reflection

Interface to process: Welding Flange



Figure 2. BUCHI NIR-Online® Multipoint System.

### 3. Results

Table 1 shows the average calibration performance of the BUCHI NIR-Online® Multipoint System consisting of 1 Multipoint Sensor and 9 Multipoint Heads (Fig. 2). Measured parameters include moisture, fat and protein at the following check points: raw material intake, after mixing and after pelletizing.

Table 1. Calibration performance.

Parameter	Range [%]	SEC
Raw material intake (Cereals)		
Protein	8.0-16.9	0.35
Moisture	9.0-15.5	0.22
Fat	1.5-4.8	0.10
Feed mix		
Protein	10.0-26.6	0.40
Moisture	8.0-16.0	0.20
Fat	2.4-9.5	0.23
Feed pellets		
Protein	14.0-29.0	0.30
Moisture	9.0-14.0	0.20
Fat	4.0-14.0	0.30

SEC: Standard error of calibration (absolute)

Other parameters monitored successfully are crude fibre, starch and gluten.

### 4. Conclusion

Results clearly show that the NIR-Online® Multipoint System is able to monitor the entire feed production process by simultaneous measurement of key parameters. Online determinations allow immediate decisions and in-process optimizations leading to maximized efficiency and profitability.

### 5. References

- [1] ISO 6496:1999. Animal feedings stuffs – Determination of moisture and volatile matter content, 2016.
- [2] ISO 6492: 1999. Animal feeding stuffs – Determination of fat content, 2016.
- [3] ISO 5983-1:2005. Animal feeding stuffs – Determination of nitrogen content and calculation of crude protein content – Part 1: Kjeldahl method, 2014.