![BUCHI SWITZERLAND logo]

Application Note
No. 324/2023

Monitoring pork fat-melting

BUCHI NIR-Online® process analyzer:
Free Fatty Acids, Iodine Value (IV), Peroxide Value (PV), and Moisture with NIR

1. Introduction

Pork fat is a valuable natural resource used for the food and feed industry as well as for technical applications including biodiesel production. Real-time process monitoring is of utmost importance to ensure a standardized and high-quality end product for the various purposes and to utilize feedstock efficiently at the same time.

With the installation of a BUCHI NIR-Online® process analyzer after the separation step of a wet-melting process, the quality of the end product is assured, standardized, and documented in a fast, simple, and reliable way.

2. Equipment

- · BUCHI NIR-Online® process analyzer: X-One (NIR only)
- · Wavelength range: 900 – 1700 nm
- · Measurement principle: Transflection
- · Interface to process: X-Cell with a path length adapter

3. Application

Production control starts with the inspection of incoming raw material, continues along the pre-treatment steps, and leads to final monitoring of the end product quality. BUCHI NIR-Online® analyzers are used along the production chain to ensure that the process is operated under optimal conditions at all times.

Implementation of a BUCHI NIR-Online® process analyzer after the separation step (Fig. 1) provides full quality control of the end product. Within seconds, several parameters such as FFA, Iodine value, or Peroxide value in pork fat are continuously, simultaneously, and accurately measured in real-time and thus enable automated binning according to quality (Table 1). In contrast, the traditional laboratory methods for animal fat analysis are time-consuming and therefore exclude real-time correction of process deviations by monitoring e.g., FFA or Iodine value [1].
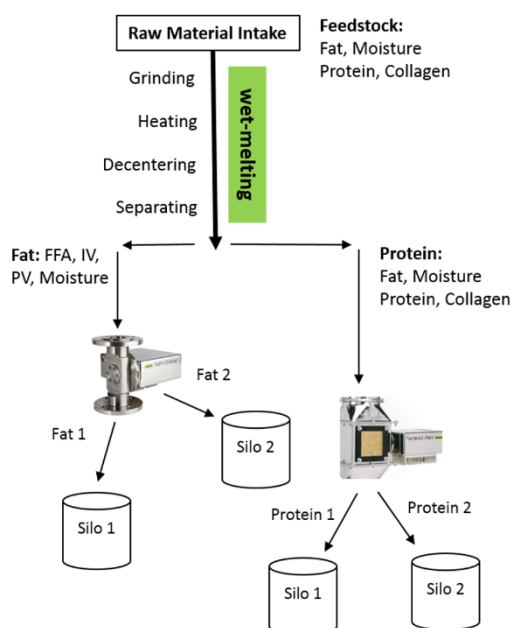

Figure 1: Pork fat extraction by wet-melting process.

4. Result

The BUCHI NIR-Online® process analyzer was found to be suitable for accurate measurements of the relevant chemical process parameters FFA, Iodine, and Peroxide value and moisture in pork fat (Table 1).

Table 1: Calibration performance.

Parameter	Range	SEC
Free fatty acids (FFA, %)	0.15 – 0.85	0.03
Iodine value (IV)	53 – 69	0.16
Peroxide value (PV)	0.10 – 2.10	0.19
Moisture (%)	0.010 – 0.230	0.006

*SEC: Standard error of calibration (absolute)

Other parameters that can be monitored successfully in feedstock (e.g., pork rind) and the protein stream include moisture, fat, protein, and collagen content.

5. Conclusion

The results show clearly that an NIR-Online process analyzer is able to measure simultaneously multiple properties of pork fat after the separator. Online measurements provide real-time determination of fat composition, thus allowing optimal differentiation of product quality leading to maximized efficiency and profitability.

6. References

[1] AOCS. 1998. Official Methods and Recommended Practices of the AOCS. 5th ed. Am. Oil. Chem. Soc., Champaign, IL.