

## Analysis of Moisture, Protein, Fat, Sugar and Minerals in Liquid Feeds Using the DA 7200

### Introduction

Compositional analysis of Liquid Feeds is an important step in verifying proper nutritional value at the mixer and prior to shipment to customers. Nutritional information is vital to farmers when formulating feeding strategies.

The Near Infrared Reflectance (NIR) technique is particularly suited for measurement of Liquid Feeds, but in the past instrument limitations have not permitted users to reap the full benefits of NIR. Sample preparation requirements, special cups, and a small analysis area made analyses laborious, time consuming and error-prone.

### Diode Array 7200

The DA 7200 is a new full-spectrum, NIR instrument designed for use in the grain and feed industries. Using novel diode array technology, it performs a multi-component analysis in only 6 seconds with no sample grinding or sample preparation required.

During this time approximately 300 full spectra are collected and averaged. As the sample is analyzed in an open dish, the problems associated with sample cups are avoided and operator influence on results is minimal.

### Experimental

Approximately 180 liquid feed products were analyzed in a DA 7200 equipped with the Disposable Cup Module. The samples encompassed feed mill samples, finished liquid feeds, and suspensions. A key feature



of the DA 7200 is its use of non-contact sampling. Each sample was poured into a disposable sample cup, analyzed, and poured back into the sample bottle. The wet chemistry results were supplied by the manufacturer. Perten Instruments developed calibrations using Partial Least Squares (PLS) regression. Multiplicative Scattering Correction (MSC) and Savitsky-Golay 1<sup>st</sup> Derivative was used as a data pre-treatments to improve the calibration models.

### Results and discussion

The DA 7200 results are very accurate when compared to the results from the reference methods. Statistics for the respective parameters are presented in the table below and graphs are displayed on page 2.

Parameter	Range	Samples	R <sup>2</sup>	SECv*
Moisture	22.55-47.63	187	0.908	1.48
Protein	5.90-54.35	148	0.969	2.25
Fat	1.75-11.37	52	0.836	0.71
Sugar	31.3-47.1	36	0.680	2.77
Ca	1.9-10.88	94	0.910	0.64
Mg	0.11-1.67	94	0.749	0.19
P	0.3-1.03	94	0.522	0.12

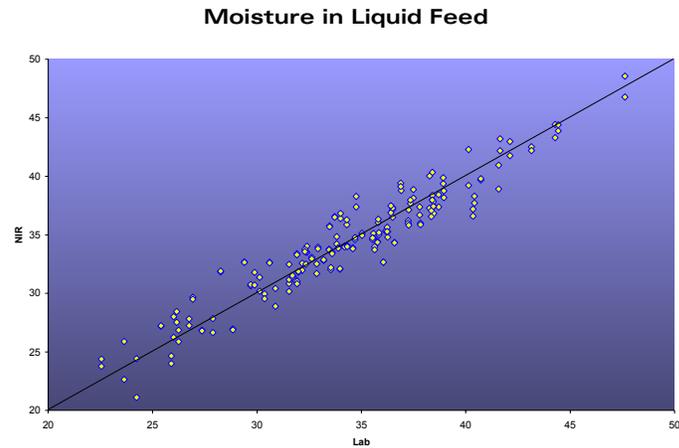
The differences between the DA 7200 and the reference methods are of the same magnitude as typical differences between two different reference labs. The DA 7200 is more precise than the reference methods meaning that replicate analyses are much more repeatable and representative.

In summary it is concluded that the Diode Array 7200 can analyze liquid feed products for the aforementioned constituents. The disposable sample dishes allow users to quickly and accurately analyze samples without any sample preparation or subsequent cleaning requirements. The overall speed sampling and analysis speed produces results in nearly real-time allowing for analysis of each batch mix and each shipment.

## Perten Instruments Application Note DA – Liquid Feed A

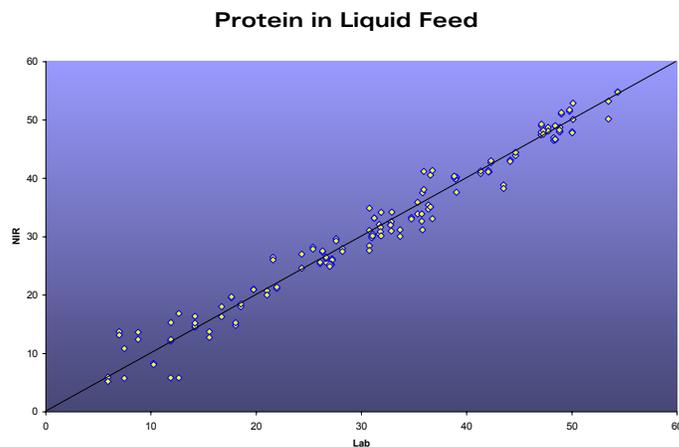
### Moisture

Proper moisture levels are important for product consistency and quality. This calibration covers a very wide range and performs well from just above 20% all the way up to 50% moisture.



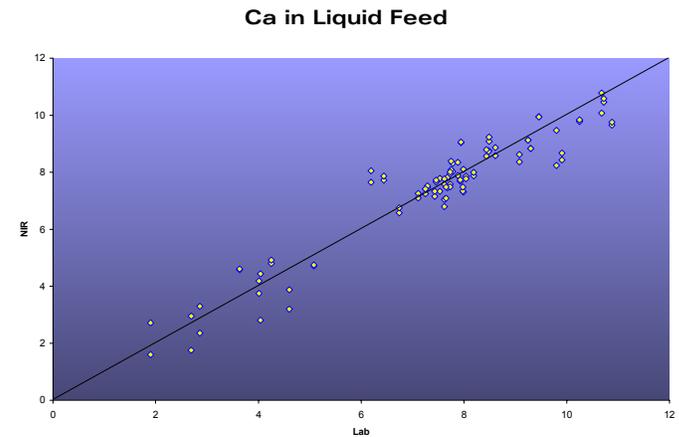
### Protein

Liquid protein supplements are a valuable asset to farmers and cattle processors. With the DA 7200 protein can be determined accurately, from very low levels up to more than 50%.



### Ca

Calcium and other minerals are important components for lactating cows. The correlation between DA 7200 and lab reference values is very good.



\* SECV is the standard deviation between NIR and Lab data calculated in a way that describes the future performance of the calibration.