DeltaInstruments
An Advanced Instruments Company

Application Note

NPN - Calculated Urea

Contents:	Analysis of the NPN / Calculated urea in raw milk
Application note no.:	203
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Introduction

Delta Instruments BV, a subsidiary of Advanced Instruments, Inc. is pleased to announce the introduction of the rapid, routine determination of **NPN/Calculated urea in raw milk** for Delta Instruments FTIR milk analyzers.

It is well known that concentrations of non-protein nitrogen (NPN) and urea in fresh milk are strongly correlated and that NPN on average consists for about 45% of urea.

Analysis of **NPN/Calculated urea in raw milk** provides a useful indication of how effectively cows digest protein in the rumen. This, in turn, provides vital information for the management of feeding strategies and reproductive performances. With the **NPN/Calculated urea** analysis results, ration content or sequence can be modified so as to optimize feeding costs, milk production, body score, reproductive performance, milk production for cheese and environmental nitrogen waste reduction.

This robust calibration model works on all Delta Instruments **LactoScope FTIR** or **CombiScope FTIR** milk analyzers. The functional heart of the LactoScope FTIR is the patented FTIR spectrometer. The pre-aligned Wish Bone construction provides advantages that include ***high reliability*** and ***calibration transferability***.

Benefits of NPN/Calculated urea measurement

Time Savings	- rapid-routine monitoring of NPN/calculated urea with speeds of up to 400 samples per hour
Cost Savings	- Delta Instruments supplies the reliable and robust NPN/Calculated urea calibration model **free of charge** with any new FTIR analyzer*.
Low cost per sample	- No additional consumables or instrumentation needed

** Upon request of the end-user*

Specifications

	Accuracy Sd	**SEP[#]**
Accuracy Individual Cow Milk	< 4 mg urea/dL	3.6 mg urea/dL
Accuracy Bulk Tank Milk	< 3 mg/dL	2.0 mg urea/dL
Repeatability	<1.5 mg urea/dL	
Analytical range	10-100 mg/dL	

** Results of validation studies with a total set of 330 samples.*

The Non Protein Nitrogen (NPN) of raw milk correlates well to the Urea content of both herd milk (figure 1) and individual cow milk (figure 2). References 1,2,3,4,5.

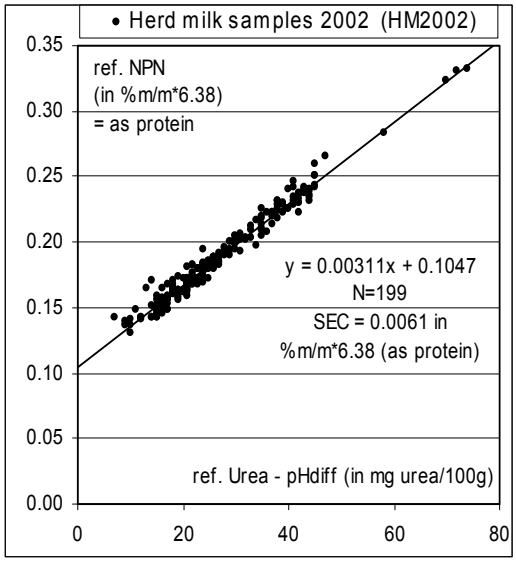

Figure 1

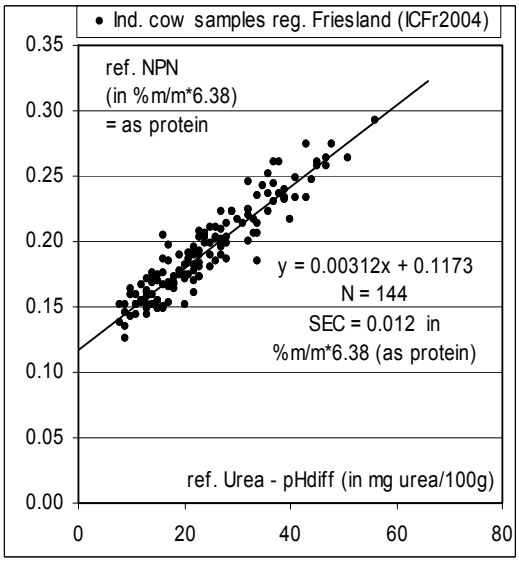

Figure 2

Measuring the NPN content of a fresh milk sample in the Mid Infrared (ref.6) then allows the Urea content to be
calculated using a univariate relationship of the form NPN = a * Urea + b where a and b are constants and b is the non-Urea
fraction of NPN.

Specifications

Study results of Delta Instruments' IR calibration model for NPN show that it can predict the urea content of herd milk
with an SEP of +/- 2 mg urea/dL (figure 3) and an SEP between 3 to 4 mg urea/dL for individual cow milk (Figure 4) while
maintaining a repeatability standard deviation of less than 1.5 mg urea/dL

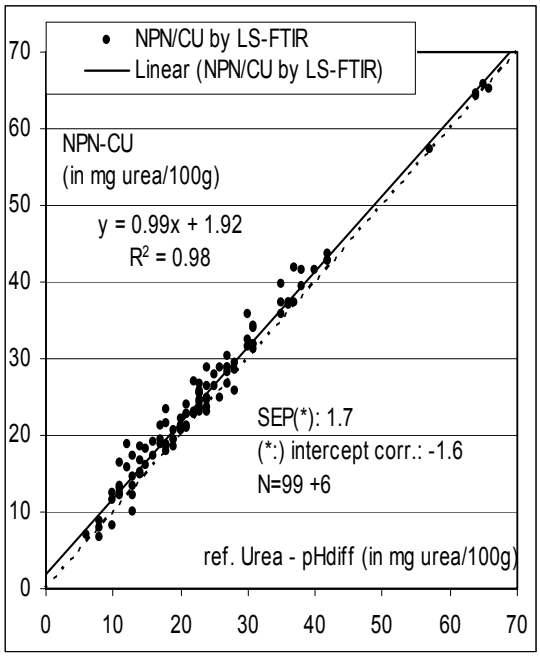

Figure 3

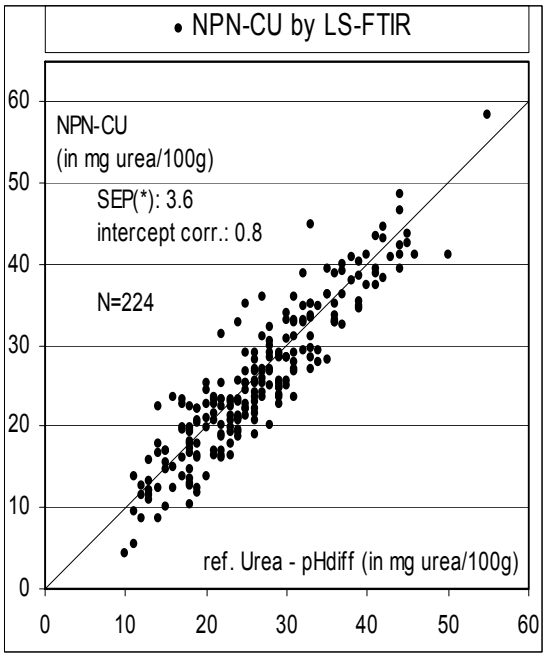

Figure 4

The results above compare the Urea content of samples as calculated from the NPN determination (NPN/CU) to
Urea as determined using the reference method (ISO14637/IDF195)

References

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