

2011 HOUSE AGRICULTURE

HB 1359

2011 HOUSE STANDING COMMITTEE MINUTES

House Agriculture Committee
Peace Garden Room, State Capitol

HB 1359
January 27, 2011
Job #13540

☐ Conference Committee

Committee Clerk Signature



Explanation or reason for introduction of bill/resolution:

Relating to the calibration of instruments used to measure grain protein

Minutes:

Rep. Monson, Co-Sponsor: (See attached #1)

Dan Wogsland of the ND Grain Growers Assn. and I have been discussing things we could do to make this bill better. (See attached email #2)

Rep. Nelson, Co-Sponsor: (See attached #3a)
Read from attached #3b, pages 1, 9, 10, 11.

There are places in ND where they are still grinding the sample and putting it in the cell. Those analyzers are very prone to operator error. If this was outdated in 1988, I know there are machines like that still used in North Dakota.

Back in 1988 there was one instrument that could function under both cold and hot temperatures.

If an operator hasn't cleaned the sample properly you can be off. Straw in a sample will put it way off.

The instruments are generally quite good. I don't think the operators are intending to commit errors. I think this would be comparable to the same way when you fill up gas at the gas station. Most gas pumps are accurate and yet to assure the public, the public service commissioner tests those pumps once a year to make sure that they are accurate. I think it would be reasonable to have the public service commission go through and check samples. Have the operators run the machines with those check samples and see that they are getting accurate readings.

Representative Mueller: Grain facilities won't check protein and instead ship it off and have them check it and then charge you \$30 for it. Would that happen more often if we passed a bill like this?

Rep. Nelson: I don't see it as being a practical way. That grain elevator needs to decide what bin to put it in. I don't think accuracy is a problem. It is more public security. Not everyone runs a check sample as often as they should. Some machines are out of date and should be replaced.

Chairman Johnson: At our elevator, if that sample isn't accurate they will get dinged when it gets on the rail cars. Usually they are pretty close.

Rep. Nelson: I would agree. It is more a matter of public confidence. When they get a discount, it would be nice to know the machine is accurate.

Dan Wogsland, Executive Director of ND Grain Growers Assn: We are here to suggest alternatives. Protein discounts and premiums yesterday ranged anywhere from 15 cents a fifth to 34 cents a fifth going from 14 to 15 protein and range around that 20 cents a fifth down from 14 percent protein down to 13 percent. It is big money to producers and elevators. It calls for the accuracy of these protein tests. This bill does have problems.

1. When you look at having the Public Service Commission do these tests, the gold standard for protein tests in the State of North Dakota is FGIS (Federal Grain Inspection Service). You can't serve both sides. No other state in the nation has a state agency that overlooks this type of protein testing. They do look at weights and measures but not protein testers.

An alternative is given in my email. (See attached #2)
Once a year the Public Service Commission comes out to test the weights and measures of each elevator. That is a random test. Why not have them observe a protein test at the same time. Give the elevator up to six tests so they can average for accuracy. Then take that same sample to the Federal Grain Inspection Service which is a \$7 test. That test is sent back to that elevator and then you have the ability to compare. Then we could have public confidence.

Representative Boe: How close do these tests have to come up to each other?

Dan Wogsland: I would suggest that you only run one sample up to six times. The comparison is for the producer to see what the variation is.

An example: A firm from Denmark is testing portable protein testers. We brought those in and took one sample. We got as much as 4/10 of a percent of protein difference.

Representative Wall: What would the fiscal note be for the Public Service Commission?

Dan Wogsland: The test cost would be born by the elevator. They are there already. The PSC employee would observe that the test is done. It is a third-party verification.

Representative Schmidt: Could the PSC have with them a tester that would be certified to be accurate with the federal system? Then they compare the sample with the elevator tester.

Dan Wogsland: I think that is a costly option. Where the test goes is where that elevator already does its testing.

Representative Headland: What if no one hauls in a load of wheat when the inspector is there?

Dan Wogsland: There would be wheat somewhere in the facility that could be used.

Representative Trottier: I have a constituent that is concerned there would not be a third party involved because they use the Federal Grain Inspection Service now and he felt that was the official. If they bring in another one it would disturb the whole process.

Dan Wogsland: I believe that is right. It would be observed and not regulated by the PSC. You could have that third party verification that the sample had been taken, tested, and sent in.

Representative Holman: Is there research to find an alternative or better method of determining protein.

Dan Wogsland: That is a better question for ND Grain Dealers Assn.

Representative Rust: The readings from a tester, are they in tenths?

Dan Wogsland: The protein scales that farmers are paid on are on one-fifth.

Opposition:

Steve Strege, Executive Vice President of ND Grain Dealers Association:
(See attachment #4)

The problems that Rep. Nelson was citing were from Canada. That is not our system. We have a better system. To suggest there is a lack of public confidence in our protein testers, I don't see it. Right now every time a farmer has a dispute there is a procedure in law. We don't need more government regulation.

Representative Holman: I'm interested in the science of protein testing. I started when we didn't test. Is there research for another method of testing?

Steve Strege: Maybe FGIS can answer that. In the early 90's we went to the whole grain analyzer. That would give you several different readings. Then everybody could see there is a range of protein. It would take the average. We have had very little problem with protein variation since then.

Representative Boe: The modern day testers now would test into tenths of a point?

Steve Strege: The elevator managers can tell you more.

Dan DeRouchey, Manager of Berthold Farmers Elevator LLC, Berthold:

(See attached #5)

Refers to sign with Procedure for Resolving Grain Grade Disputes. (See attached #6)

Chairman Johnson: Do you have the same option when you send cars to mill and there is a disagreement on the protein? Can you go back to FGIS and use their numbers?

Dan DeRouchey: Yes. We can do it on a per car basis. A lot of times the buyer will also have that right. If we pick out high cars, they will pick out the low cars so the whole train gets redone.

Chairman Johnson: Then you can settle on the federal?

Dan DeRouchey: Yes, we do.

Representative Boe: What is wheat worth today?

Dan DeRouchey: Wheat is at \$9.50 on a 14 protein for spring wheat.

Representative Boe: What is your discount schedule on protein?

Dan DeRouchey: The western elevators, typically if the grain is going west, it is 25 cents a quarter up and 30 cents a quarter going down. That changes and it is different with every elevator.

Representative Boe: Using your high number of .4, varying up .4, what is my discount?

Dan DeRouchey: On the down side it could be 30-60. Keep in mind .1 is the average. We already have the procedure in place. At our elevator we send in almost 2-3 a day for disputes. The system works.

Representative Boe: That's not where I am going. Let's use your number of .1. What is my discount?

Dan DeRouchey: A discount on a 13.9? 30 cents.

Representative Boe: Somebody took 15 cents from me. You're testing in the tenths but you are discounting in the fifths. Why is that?

Dan DeRouchey: In the quarters—because that is what the destination is on.

Representative Boe: Because the destination does the same?

Dan DeRouchey: Right.

Representative Wrangham: Is there a standard cost for sending samples in to FGIS?

Dan DeRouchey: We don't charge to send it in. If a farmer disputes it, it is automatically the standard course of business. We do charge per bushel. Every bushel that goes through is charged $\frac{3}{4}$ of a cent on testing. The elevator is charged by the inspection point \$7 or \$8 for protein.

Paul Coppin, Manager at Reynolds United in Reynolds and Buxton, ND: I've been in the grain business for 33 years. Of those 33 years the complaints I have had with protein can be on one hand. This is the last unit train that I shipped (see attached #7). We do this on every train we ship. We compare our protein to what they get at FGIS approved. Ours is Fargo. Each car will vary a tenth or two. The train as a whole is very accurate. Our complaints are not on the test but on the discounts which is a market function not a technical function.

We bought the last tester in 2008. It cost about \$25,000. If we have an error shown on our tester, we call a service tech to send it in or they help over the phone. Our machines are checked daily. We have three machines which are checked amongst themselves. We can't be high or low. If we are a tenth high or low, that is a big difference. The process works well. I don't think we need this bill.

Representative Boe: What is wheat worth?

Paul Coppin: Yesterday we were at \$9.30.

Representative Boe: Premiums and discounts?

Paul Coppin: I'm on the eastern side. We are 15 cents a fifth. So we are 75 cents per point down.

Representative Boe: You test on the tenth?

Paul Coppin: We test on the tenth.

Representative Boe: But you sell on the fifths?

Paul Coppin: We sell on two tenths.

Representative Boe: That is based on destination market? You say you are shipping to a Minneapolis market vs. a west coast market?

Paul Coppin: They are based on where we ship. We ship in the Minneapolis market.

Representative Boe: If you were going to pay on the tenth, what is the danger in that? If your discount instead of being 15 cents a fifth, would be 7 or 7 and a half a tenth. What is the danger of that in your business model?

Paul Coppin: If we load a car at 13.9, we would get discounted the full amount because the market will pay me based on 13.8.

Representative Boe: That wouldn't average out the long run? When you are rounding down all the time, it is in your favor. If you paid in the tenth, you wouldn't be rounding down. You'd pay exactly on what the test said.

Paul Coppin: We try to match with what the market offers us. I don't know of any firm that will pay on the tenth.

Representative Boe: Yet?

Representative Trottier: That allows for differences in protein?

Paul Coppin: It does average out. That is how we exist. I manage a cooperative. What I do for that year is out in public. My board won't allow me to make 50 cents a bushel. I will be on the soup line if I don't make my margin. Our machines can't be inaccurate if we want to stay in business.

Representative Trottier: I worked in an elevator at one time. My first lesson was to "Trust people that trust you."

Paul Coppin: You are right. We buy and sell grain based on our reputation.

Patrick Fahn, Director of the Compliance and Competitive Markets Division of the Public Service Commission:

(See attached #8)

Representative Mueller: In the bill, Line 17 says "scale, weight, measure." Then we go to new language. How do you differentiate what is being asked in the new language from what is already in law?

Patrick Fahn: Under the current statute we do not test protein analyzers. This would be specific to that.

Representative Mueller: You don't do anything with protein testers?

Patrick Fahn: Not at this time.

Representative Boe: Does the law preclude you from protein testers along with weight and measuring devices. Would this law allow you to do that?

Patrick Fahn: If the law was amended to specifically say the commission were to test protein analyzers, it would be very clear. It isn't prohibited. We do test measuring and weighing devices but we don't adjust for errors. "Calibrate" means to test and adjust. The new bill suggests the commission should calibrate.

Representative Boe: Are you familiar with the protein tester machines they are using now?

Patrick Fahn: We are not familiar because we don't have the testing program.

Representative Wrangham: You currently test gas pumps. Who does the testing of the octane level or the percentage of ethanol?

Patrick Fahn: The Health Department tests for octane and percentage of ethanol.

Chairman Johnson: Closed the hearing.

Representative Belter: Moved **Do Not Pass**

Vice Chairman Kingsbury: Seconded the motion

A Roll Call vote was taken. **Yes: 11, No: 0, Absent: 3,**
Representatives Rust, Wall, Mueller)

DO NOT PASS Carries.

Representative Belter will carry the bill.

Date: 1/27/11

Roll Call Vote # 1

2011 HOUSE STANDING COMMITTEE ROLL CALL VOTES

BILL/RESOLUTION NO. 1359

House **Agriculture** Committee

Legislative Council Amendment Number _____

Action Taken: ☐ Do Pass ☒ Do Not Pass ☐ Amended

☐ Rerefer to Appropriations

Motion Made By Representative Belter Seconded By Vice Chairman Kingsbury

Representatives	Yes	No	Representatives	Yes	No
Dennis Johnson, Chair	X		Tracy Boe	X	
Joyce Kingsbury, Vice Chair	X		Tom Conklin	X	
Wesley Belter	X		Richard Holman	X	
Craig Headland	X		Phillip Mueller	AB	
David Rust	AB				
Mike Schatz	X				
Jim Schmidt	X				
Wayne Trottier	X				
John Wall	AB				
Dwight Wrangham	X				

Total **Yes** 11 **No** 0

Absent 3

Bill Carrier Representative Belter

If the vote is on an amendment, briefly indicate intent:

REPORT OF STANDING COMMITTEE

HB 1359: Agriculture Committee (Rep. D. Johnson, Chairman) recommends **DO NOT PASS** (11 YEAS, 0 NAYS, 3 ABSENT AND NOT VOTING). HB 1359 was placed on the Eleventh order on the calendar.

2011 SENATE HUMAN SERVICES

HB 1159

2011 SENATE STANDING COMMITTEE MINUTES

Senate Human Services Committee
Red River Room, State Capitol

HB 1159
3-9-2011
Job Number 15218

☐ Conference Committee

Committee Clerk Signature

Tommonson

Explanation or reason for introduction of bill/resolution:

Relating to administration of epinephrine.

Minutes:

Attachments.

Senator Judy Lee opened the hearing on HB 1159.

Rep. Lois Delmore (District 43) introduced HB 1159. It expands state law, which already covers insect bites, to cover allergic emergencies particularly for people with food allergies in the same way. She provided information on laws in other states – Attachment #1. She also provided an article about the tragic story of a young woman in Chicago – Attachment #2

Senator Spencer Berry asked how a person becomes authorized.

Rep. Delmore responded that they already do that type of training for insect bites similar to CPR training etc. It would not be a major cost factor.

Rep. Kathy Hawken (District 46) testified that an important piece of this is that a person could have a pen for a friend or someone else with the appropriate training. Changing from just the insect is extremely important.

There was no opposing testimony.

Tim Wiedrich (Department of Health) made comments in response to the earlier question by Sen. Berry. In 1996 administrative rules were passed that dealt with the issues about how they actually enact the legislation that was passed in 1995. Those rules have three components to them: 1. They define who it is they are speaking about. At that time they did not restrict it to bee stings. 2. How the training happens and who maintains the records. They pass that responsibility on to physicians. 3. They specify a single use device.

Senator Gerald Uglem asked if there is an expiration date on an epipen or can it be carried indefinitely.

Mr. Wiedrich replied that expiration dates are associated with the medications and there are temperature ranges in which the medication needs to be maintained and that's all disclosed on the label.

Senator Spencer Berry asked if they recommend carrying a pediatric size and an adult.

Mr. Wiedrich said it would depend on what the physician's determination is about who the likely individuals are that are carrying the pen and the likely people they are going to be encountering.

Senator Spencer Berry asked if this can be anybody.

Mr. Wiedrich said the situation this is trying to fill would be those situations in which there isn't that direct custodial care.

Senator Judy Lee asked if they would be better off looking at using at a more generic description of who should be able to do this.

Mr. Wiedrich felt they could come back and make modifications to use more expansive language. It could be done in rule.

Senator Judy Lee was surprised that food allergies weren't a part of this in the beginning.

There was discussion on legislation from 2005 regarding, in a school situation inhalers for asthma and epipens, relieving liability as long as the student has an approved plan from their health care provider and whether it is consistent with this.

The hearing on HB 1159 was closed.

Senator Gerald Uglem moved a **Do Pass**.

Seconded by **Senator Spencer Berry**.

Roll call vote 5-0-0 – **motion carried**.

Carrier is **Senator Gerald Uglem**.

Date: 3-9-2011

Roll Call Vote # 1

2011 SENATE STANDING COMMITTEE ROLL CALL VOTES

BILL/RESOLUTION NO. 1159

Senate HUMAN SERVICES

Committee

☐ Check here for Conference Committee

Legislative Council Amendment Number _____

Action Taken: ☒ Do Pass ☐ Do Not Pass ☐ Amended ☐ Adopt Amendment
☐ Rerefer to Appropriations ☐ Reconsider

Motion Made By Sen. Uglem Seconded By Sen. Berry

Senators	Yes	No	Senators	Yes	No
Sen. Judy Lee, Chairman	✓		Sen. Tim Mathern	✓	
Sen. Dick Dever	✓				
Sen. Gerald Uglem, V. Chair	✓				
Sen. Spencer Berry	✓				

Total (Yes) 5 No 0

Absent 0

Floor Assignment Sen. Uglem

If the vote is on an amendment, briefly indicate intent:

REPORT OF STANDING COMMITTEE

HB 1159: Human Services Committee (Sen. J. Lee, Chairman) recommends **DO PASS**
(5 YEAS, 0 NAYS, 0 ABSENT AND NOT VOTING). HB 1159 was placed on the
Fourteenth order on the calendar.

2011 TESTIMONY

HB 1359

Testimony on HB 1359

Rep. David Monson

#1
1/27/11

Chairman Johnson and members of the House Agriculture Committee, for the record I'm Rep. David Monson, Dist. 10.

I introduced HB 1359 on behalf of one of my constituents. He attended one of our pre-session forums that we held in District 10 in December. He was very concerned about the accuracy of protein testers at local elevators. He feels, as I do, that when protein premiums and discounts can make the value of a semi-load of wheat fluctuate by hundreds and even thousands of dollars per load, it's imperative that these testers be as accurate as possible. Whether this bill is the answer to the problem is certainly debatable, but with so much money at stake for both the farmers and the grain dealers, a discussion on the issue is certainly warranted.

I don't profess to be an expert on protein testers, but as a farmer I know there are several kinds of testers used at various elevators that I frequent. I have no idea which is most accurate; how often they're calibrated; who, if anyone, checks their accuracy; how long they continue to be accurate after calibration; or any other details surrounding the calibration, testing, and accuracy of protein testers. I do know that it should be in the best interest of both the farmers and the elevators to have as accurate a protein tester as possible. Millions of dollars are at stake to all parties each year.

Mr. Chairman, as I stated, I introduced this bill on behalf of a constituent. However, as it would appear now, based on the interest and controversy surrounding this bill, it seems this is a real burning issue for a lot of people. Again, I don't know if this is the answer, and I know others here have ideas on how to amend the bill to perhaps make the bill better. I also know that Rep. Nelson from District 9 has been doing a lot of research on this bill. He is one of the co-sponsors. I would be willing to try to answer any questions you may have, but I know others who follow me have much more knowledge on this issue and could discuss this bill with much more authority than I. I know Dan Wogsland of the ND Grain Growers Association may suggest an amendment he shared with me. I'm happy to allow him and others to offer amendments and for you to consider them all to make this bill the best workable bill to address the important issue of protein tests.

HB 1359

#2

Monson, David C.

From: Dan Wogsland [danw@ndgga.com]
Sent: Tuesday, January 25, 2011 6:37 PM
To: Monson, David C.; Olafson, Curtis
Cc: Fisher, Neil H.; hklein@westriv.com; thyfarms@polarcomm.com;
dakagseeds@ndgateway.com; dljohnsrud@yahoo.com; lentz@utma.com;
dwisness@ruggedwest.com; gneshem@hotmail.com; dgoehring.usb@gmail.com;
jelkin@ndsupernet.com; jtweinand@hotmail.com; Litchville Rural Fire Dept.; mjwest1562@gmail.com; mdmartin@drtel.net; sheena@ndgga.com; terry@weckerlyfarms.com
Subject: HB 1359

1/27/11

Good evening!

Here may be an alternative for HB 1359.

- When the PSC conducts its yearly inspection of a grain warehouse facility as a part of the PSC inspection the elevator would obtain one dry sample of wheat from its facility to be protein tested by the elevator under the observation of the PSC.
- The one sample could be tested up to 6 times on that elevator's protein tester; the results of the tests would be averaged and logged
- The one sample would then be transferred under the observation of the PSC to the Federal Grain Inspection Service (FGIS) facility normally used by the elevator in the normal course of business; transfer and testing costs would be the responsibility of the elevator.
- The FGIS results would be returned to the elevator where the elevator and FGIS comparison tests would be made available upon request.

Some thoughts....

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1/27/11

#3a

Testimony on HB1359 in front of the House Agriculture Committee by Representative Marvin E. Nelson

Grain protein testing is a way to measure an economically important characteristic of many grains, in our area the various wheats and barleys are the most important.

The testing used in grain elevators is a near infrared reflectance (NIR) most commonly, but similar machines do use near infrared transmission (NIT).

This has developed over the years in response to needing results rapidly.

Barley growers have long seen samples just a bit high in protein sold as feed, though historically elevators sell much more malting barley than they buy.

Protein discounts or premiums in wheat goes up and down but in recent years have been large, often at a dollar a percent (20 cents a fifth)

So these protein testers have become a normal part of commerce and they can make the difference of literally thousands of dollars on but one truckload. If protein testers are not regulated, it begs the question of why regulate scales at elevators either?

Reading from page 10 on the handout on protein testers by the Canadian Grain Commission.....

I think that is really the best document I know of telling the history and explaining the different types and problems with protein testing.

With training, and with monitoring, the protein testers certainly can do a good job, but different types of error do indeed come up commonly.

For instance as the Canadian Grain Commission noted, only one machine is tolerant of temperature variations and farmers bring in grain at many temperatures.

One of the biggest areas of error is if the elevator still uses the older type that required one to grind the sample and then a sample cell is loaded. Great variations in reading happens with those machines due to operator error. The whole seed testers are much more consistent due to that.

I suspect you will hear testimony that there is not problem with the protein testers, that everyone does a good job and the machines are basically problem free.

Even if that is true, would it not be great value in showing that. The PSC could develop some procedures, get some check samples with high, medium and low proteins and go and test machines. If the machines are accurate, that will quickly be shown to be the case. They test every gas pump once a year, they tend to be pretty accurate as well, but consumers are given the assurance of having them checked. Such assurance should also be given the growers of this state.

HB 1359

#36
Rep. Nelson
1/27/11Canadian Grain Commission
Commission canadienne
des grains

Protein Testing Methods at the Canadian Grain Commission

Phil Williams, Debbie Sobering and John Antoniszyn¹

Proceedings of the Wheat Protein Symposium, Saskatoon, SK,
March 9 and 10, 1998

Introduction

Methods for testing plant materials for protein or total nitrogen content are handicapped by the fact that it is essentially impossible to prepare "protein" itself in a state of purity adequate for the establishment of the true accuracy of the test method. As a consequence, "protein" content is estimated by determination of the total nitrogen content of the material, then expressing the result as "protein", by multiplying the value obtained for total nitrogen by a factor. The factor differs among materials (and possibly even among samples of the same material). The figure of 5.7 is used for wheat and wheat products for human consumption. Values for other commodities range up to 6.25, including wheat used as animal feed.

Methods for protein-testing can be roughly subdivided into Reference and Prediction methods. The reference methods most commonly used in grain analysis are the Kjeldahl method¹, and its recent challenger, the Dumas, or Combustion Nitrogen Analysis (CNA) method² (The Dumas method was introduced by Jean-Baptiste Dumas in 1831², so predates Kjeldahl's method by more than 50 years. Since Kjeldahl has been honoured by the use of his name in connection with protein-testing for many years, it seems appropriate to honour Dumas in the same way). The salient features of both of these reference methods are summarized in Table 1:

Table 1. Comparison of Kjeldahl with Dumas methods for protein-testing.

	Kjeldahl	Dumas
Chemicals used	Conc. H ₂ SO ₄ , 40 % NaOH, K ₂ SO ₄ , TiO ₂ /CuSO ₄ (or HgO), H ₃ BO ₃ , KH Phthalate, Methyl Red Phenolphthalein, pumice, water.	Air, Oxygen, Helium, Copper turnings, EDTA, Nitrogen catalyst, Mg Perchlorate, Sodium hydroxide, alumina oxide pellets.
Other Supplies*	Kjeldahl and Erlenmeyer flasks, burettes, Filomatic acid, alkali and water dispensers, stirring equipment, large containers for acid, etc.	Tin foil squares, brushes, tin capsules, combustion, reduction and absorption tubes, cotton wool, steel wool, particle filters, tubing.
Ancillary equipment	Ductwork for corrosive fumes, acid-resistant Fans, fume washer, fans, etc.	Ductwork for warm air**
Disposal of chemical residues	Must be collected and professionally disposed of in many locations.	Non-toxic, can be trashed or washed down the drain.
Time per test	120 minutes (batch of 24)	3 minutes, continuous

Canada



Degree of hazard in operation*** 6 2

Precision (CV %) 1.2 0.7

Notes: * Does not include main equipment (Kjeldahl digester and distillation apparatus, or CNA instrument:

** Optional, but advisable for large-scale testing:

*** Arbitrary scale of 1 - 10, with 10 being extremely hazardous, and 1 completely safe. There is a risk of burns when maintaining the CNA instrument.

¹Canadian Grain Commission, Grain Research Laboratory/Industry Services, Winnipeg, Manitoba, Canada.

HISTORY - THE KJELDAHL ERA.

In 1971, Canada became the first wheat-exporting country in the world to offer the top milling grades of wheat at government-guaranteed minimum protein levels. The exercise was prefaced with a year of developmental work, during which the system was established.

In this system, samples (called primary samples) were taken at the country elevator points at the time of loading the cars, and mailed to laboratories in either Winnipeg or Calgary for Kjeldahl testing, and the results telexed to the terminal ports. By the time the trains arrived at the port, the results were ready and the grain could be binned accordingly. During unloading, a continuous sample (called the Unload sample) was taken, blended, and re-tested for protein by Kjeldahl, at Calgary (west coast cars), or Thunder Bay. These tests on the Official Unload samples established the Official result, forming the basis for development of guidelines ("bands") for binning, and statistical analysis of segregation data. Cars for which no sample was received were binned on the basis of the station mean protein content, which was updated every 10 cars.

Several important facts emerged, among them being the magnitude of the errors involved with testing itself, and the overall error of the program, which included sampling error at loading and unloading points. The Kjeldahl test used by the CGC Grain Research Laboratory (GRL), which was assigned the responsibility for setting up and monitoring the test method, was the Winkler modification³ which involves digestion, distillation into saturated boric acid, and direct titration of the ammonia against standard sulphuric acid.

Prior to the segregation program, the GRL had used the Gunning/Arnold modification, which involved digestion, distillation into standard acid, and back-titration of the residual acid against standard sodium hydroxide solution. This is a clumsy method at best, and the concept of preparing, standardizing and storing very large volumes of both standard acid and alkali made it impracticable (over 7500 litres of standard acid, and over 4100 litres of standard alkali per year in Winnipeg alone). A further modification introduced at that time was to replace the mercuric oxide catalyst with a non-toxic catalyst, developed at the GRL, and based on titanium dioxide/cupric sulphate⁴. This was the method that was in use by the GRL for Kjeldahl-testing up until the time of change-over to Dumas testing in 1996.

The GRL retained responsibility for the design, establishment, accuracy and monitoring of the Kjeldahl laboratories. A monitoring system was established, and a weekly report prepared indicating the inter- and intra-laboratory precision. Accuracy was based on the highest analytical grade of ammonium sulphate, and a series of check samples, which were analyzed every day. A bulk protein check (about one tonne) was prepared each year with new season wheat, weighted by terminal port and grade. This check sample was analyzed in every batch of 24 tests, and served as guideline to the technicians.

In the 1972-73 crop year the three CGC Inspection laboratories processed over 623,000 tests. During some periods over 40 shifts per week were operating. The inter-laboratory error, based on a "secret" check sample, which passed through the entire testing system including grading, was 0.18% protein, including sampling and sample preparation (CV = 1.26 %). This was significantly less than the rail-car sampling error. The overall standard deviation of



differences between Primary and Unload protein results varied from 0.35 to 0.45 from week to week. This indicated sampling errors of from 0.3 to 0.4 % protein. Further work determined that the sampling error at loading points was considerably higher than that at terminals, where the sampling and sample transfer was automated.

COMBUSTION NITROGEN ANALYSIS (CNA).

During the years 1993 - 1995 CNA analyzers have been extensively studied at GRL, particularly in the Oilseeds, and Analytical Methods Development sections⁵, and CNA has been the official method for determination of protein in oilseeds at the GRL since 1993. The principle is to burn the sample at high temperature, and convert all of the nitrogen from the form in which it occurs in the sample to elemental nitrogen, subsequently measured by a thermal conductivity cell.

Based on extensive evaluation on all wheat classes the CGC decided to adopt CNA as the official reference method for testing all grains, seeds and derived products for protein and total nitrogen, and this decision officially came into effect as of August 1st., 1996. The main reasons underlying the decision include a). improved precision, b). freedom from corrosive chemicals, and c). CNA instruments are becoming more widely-used in the world. Also, there was more possibility of customer comparison of Canadian results with CNA, rather than Kjeldahl than there would have been three years before.

The GRL Oilseed section were the first to evaluate CNA, and a LECO demonstrator model was installed in the Analytical Methods Development section in 1991. Results for the determination of protein in canola seed and soybean were higher than were those obtained by Kjeldahl testing, an observation which agreed with reports from other laboratories. The precision (reproducibility) of testing wheat was superior to Kjeldahl testing, but depended upon the sample size - the standard error per test was considerably higher with a sample size of 100 milligrams (mg) than with a sample size of 300 mg.

The original decision to evaluate CNAs was prompted by the increased sample size. A type of CNA analyzer had been evaluated by the GRL about 24 years previously. At that time, although the results were reasonable, the sample size was only a few milligrams, and it was felt that the sampling error would be prohibitive. Furthermore, the speed of testing would not have enabled handling of the very heavy workload at that time. It is only during the past few years that the LECO Corporation, St. Joseph, MI, have introduced instruments capable of analyzing samples of up to 300 mg of ground grain (even higher amounts with some models). The earlier models went through several stages of modification, until the Model FP-428 emerged as a reliable instrument, with the potential to replace the Kjeldahl test, with its massive use of corrosive chemicals, as a reference method for the determination of protein content.

IMPLEMENTATION OF CNA AS REPLACEMENT FOR KJELDAHL

The accuracy of CNA analysis, compared to Kjeldahl, showed that CNA consistently converts about 1.5 %, and up to 2% more nitrogen than Kjeldahl. This translates into 0.15 - 0.25 % higher than Kjeldahl in wheat, 0.35 - 0.45% higher in canola seed (about 20% protein), and 0.50 - 0.70% higher in soybeans (about 40 % protein). This increase in protein content should be regarded as a true increase in the protein result, rather than an apparent increase. CNA analyzers do not *generate* nitrogen or protein - they are simply more efficient at recovery of the nitrogen than other methods.

Two questions may arise:

1. Why does the Kjeldahl method not detect this small amount of extra nitrogen, which amounts to about 2% of the total?



The most likely answer is that despite every effort to maximize the efficiency of the Kjeldahl procedure, there are more than 20 factors which can affect the recovery of nitrogen by Kjeldahl and its conversion to ammonia, and the CNA method is more effective in converting nitrogen present in proteins, peptides and amino acids to elemental nitrogen, rather than to ammonia.

2. Why has the CGC not used CNA before this year?

The reasons are a). Prior to about 1990 the sample size of ground grain that the instrument could reliably accommodate was too small: b). Careful evaluation of new methods for determination of constituents with financial implications as significant as protein and moisture take time, and should be extended over more than one season, and c). More than one instrument is needed to absorb the total workload of the Kjeldahl reference testing at the GRL, and the purchase of the third FP-428 had to be budgeted.

The main advantages of the Dumas over the Kjeldahl method include speed per test, improved precision, no corrosive or hazardous chemicals, low cost of installation, and safe operation. The Dumas method is also slightly more efficient than the Kjeldahl test in extraction/conversion of nitrogen.

The changeover from Kjeldahl to CNA (Dumas) reference protein testing by the CGC/GRL made an apparent difference of about 0.15% to 0.25% in protein content over the protein range most frequently encountered in Canadian Hard wheats. Tables 2 and 3 summarize the impact of the change from Kjeldahl to CNA (Dumas) reference protein testing on GRL Remix-to-Peak loaf volume and Farinograph stability values. Table 2 is based on an increase of 1.5 % in nitrogen extraction. For convenience Table 3 is based on data rounded up to 2 % increase in nitrogen extraction. The stability values are the Farinograph figures most frequently used in the industry. The data were summarized from GRL cargo bulletins from 1992-1995.

While the impact of this increment in protein content upon wheat functionality is not earth-shaking, its impact upon the protein segregation program, wheat marketing in general, and the results of harvest surveys is highly significant.

Table 2: Implications of reporting protein on basis of different moisture levels.

Protein, %					
KJELDAHL			DUMAS/CNA		
13.5%H ₂ O	12.0%H ₂ O (U.S.)	DRY BASIS (World)	13.5%H ₂ O	12.0%H ₂ O (U.S.)	Dry basis (World)
10.00	10.17	11.56	10.15	10.33	11.73
10.50	10.68	12.14	10.66	11.84	12.32
11.00	11.19	12.72	11.16	11.35	12.91
11.50	11.70	13.29	11.67	11.87	13.49
12.00	12.21	13.87	12.18	12.39	14.08
12.50	12.72	14.45	12.69	12.91	14.66
13.00	13.22	15.03	13.20	13.42	15.25
13.50	13.73	15.61	13.70	13.94	15.84
14.00	14.24	16.18	14.21	14.46	16.43
14.50	14.75	16.76	14.72	14.98	17.02
15.00	15.26	17.34	15.22	15.49	17.60
15.50	15.77	17.92	15.73	16.00	18.19
16.00	16.28	18.50	16.24	16.52	18.77
16.50	16.79	19.08	16.75	17.04	19.35
17.00	17.29	19.65	17.26	17.55	19.95
17.50	17.80	20.23	17.76	18.07	20.54
18.00	18.31	20.81	18.27	18.59	21.12



Canadian Grain Commission
Commission canadienne
des grains

* Bold print signifies most common protein levels segregated.



Table 3: Implications of Transition Kjeldahl : CNA on Remix - to - Peak Loaf Volume and Farinograph Stability Figures.

Protein, %	Remix Loaf Volume (CC)		Farinograph Stability (Min.)	
	1CW	2CW	1CW	2CW
11.3	718	724	6.9	7.5
11.5	732	738	7.3	7.8
11.7	746	752	7.7	8.1
11.8	753	759	7.9	8.2
12.0	767	773	8.3	8.5
12.2	781	793	8.7	8.9
12.3	787	793	8.9	8.9
12.5	801	807	9.3	9.2
12.7	815	821	9.7	9.5
12.8	822	828	9.9	9.6
13.0	836	842	10.3	9.9
13.2	849	855	10.7	10.2
13.3	856	862	10.9	10.4
13.5	870	876	11.3	10.6
13.7	884	890	11.7	10.9
13.8	891	897	11.9	11.1
14.0	904	911	12.3	11.3
14.2	918	924	12.7	11.6
14.3	925	931	12.9	11.8
14.5	939	945	13.3	12.1
14.7	952	959	13.6	12.3

Sources of Error in Reference Protein testing.:

A study of the Kjeldahl test made in 1974 revealed over 30 sources of error in Kjeldahl protein testing⁶. These included sampling, sub-sampling, sample preparation (mainly grinding), blending the sample after grinding, and weighing the test amount. An earlier study by Hildebrand and Koehn⁷ concluded that sampling, sub-sampling and sample preparation were jointly responsible for over 60 % of the total error. However, most workers fail to recognize that the Kjeldahl test is really a determination of ammonia. As a result, every step, up to the actual titration including digestion and distillation, are aspects are part of sample preparation. The actual Kjeldahl titration, or determination of the ammonia is the titration. This takes only about 10 seconds, so that the part of the Kjeldahl test which realizes the result is actually faster than the NIR/NIT tests used in the CGC Protein operation!

So - where are the sources of error in Dumas testing? These are summarized in Table 4:



Table 4. Sources of error in Dumas testing:

Sampling	Sub-sampling
Sample Preparation	Blending after grinding
Moisture correction of results	Poor instrument maintenance
Impure gases, especially Oxygen	Impure EDTA
Moisture in EDTA	Residual nitrogen (air) in weighed sample
Sample size	Access of sample to instrument (liquids only)
Sporadic use of instrument	Insufficient EDTA and/or blank tests
Weighing error	Instrument malfunction

The first five sources are common to both Kjeldahl and Dumas methods. The U-D Cyclone grinder produces an excellent grind, particularly if it used in combination with a feed-rate regulator. In our experience the 1.0 mm screen is adequate, and there is no advantage in using the 0.5 mm screen in terms of precision.

Poor instrument maintenance often leads to malfunction. The daily maintenance procedure is clearly and simply outlined by the instrument software, but must be adhered to. Only the very purest source of oxygen should be used. This is 99.999 % pure - more expensive, but worth the extra expense. The impurity most commonly found in oxygen is nitrogen. Impure EDTA used in calibration can introduce errors, as can moisture in the EDTA. The GRL Dumas laboratory dries the EDTA overnight at 100 °C, and cools it in a desiccator before use. Pure EDTA is obtainable from the LECO Corporation. It contains about 0.15 - 0.2 % moisture.

Residual nitrogen in the sample can be minimized by adding the sample to the tin foil, then tightly compressing it into a pellet, using the fingers. This is more accurate than the pelleting device supplied with the instrument. Sample size affects the precision of the test. When testing ground grains, a sample of 250 mg is optimum. Earlier work verified that smaller samples increased the standard error (SE) per test. Change from 300 to 100 mg increased the SE per test in wheat and barley by a factor of two. The same change increased the SE for testing ground oats five-fold. A sample of 250 mg is recommended, since 300 mg did not improve the SE, and was difficult to compress consistently.

Access to the instrument affects the SE when liquids such as beer or wort are tested. The most consistent method is to dispense the sample (about 500 microlitres) into a tin capsule (obtainable from LECO), weigh it, and transfer in the same way as for a solid sample. The liquid attachment available from LECO was found to be less precise in our experience. If the instrument is only used sporadically, and spends several days idle it should be left on "Standby", then several samples should be tested after the Blank and EDTA calibration procedure to allow the instrument to stabilize. The LECO FP 428 is similar to the KjelFoss instrument in this respect, as well as the requirement for careful maintenance. Even when the instrument is in daily use, it is advisable to carry out at least 8 blank and EDTA tests before running actual samples.

After taring the tin foil and weighing the sample the weight is automatically entered into the instrument software. Accuracy and SE can be improved by taring the tin foil, transferring the tare weight, adding approximately enough sample, making the pellet, then weighing the compressed pellet and transferring the final accurate weight into the instrument. Weighing error is largely avoided by this procedure, since otherwise a minute loss in sample may occur while compressing the sample after transferring the weight. Instrument malfunction is rare, but may occur for a variety of reasons. It can be detected by changes in the result of analysis of the EDTA and by analysis of check samples. The manual contains information of the symptoms. Some of these can be addressed by the operator. The manual is comprehensive enough to indicate where the operator should stop, and engage a company Technician!

Monitoring of accuracy and precision is an important aspect of large-scale protein-testing. The GRL Dumas laboratory is monitored daily, using a "known" Reference protein sample, and up to 15 randomized "unknown" samples. These samples are stored in plastic bags in tightly-lidded plastic pails, at 5 °C. Periodically a set of 20



samples is passed through the laboratory. The first, third, fifth, etc. samples are tested singly and the even-numbered samples in duplicate. The last half of the samples include randomized blind duplicates. Typical results are detailed in Table 5.

Table 5. Suitable monitoring sequence for Dumas Protein-testing.

Tin Number	Sample ID	Protein %		
1	1	14.22		
2	2	12.72		
3	2	12.79	SD (dup. test)	0.065
4	3	14.07	CV %	0.46
5	4	14.66		
6	4	14.62	SD (dup. Grinds)	0.05
7	5	12.96	CV %	0.33
8	6	14.73		
9	6	14.66		
10	7	16.31		
11	8	12.61		
12	8	12.70		
13	9	12.83		
14	10	15.13		
15	10	15.10		
16	11	15.75		
17	4R	14.74		
18	4R	14.70		
19	7R	16.40		
20	5R	13.04		
21	5R	13.03		
22	12	11.85		
23	6R	14.61		
24	6R	14.75		
25	13	13.44		
26	14	12.47		
27	14	12.50		
28	15	13.87		
29	11R	15.75		
30	11R	15.78		



X Near-infrared Testing:

The search for a test fast, reproducible and accurate enough to be carried out at terminal elevators on individual rail-cars continued during the early 1970s, and culminated in the introduction of the Automated Digital Analyzer (ADA), which was a Near-infrared Reflectance (NIRR) device developed jointly by the CGC/GRL and Neotec Corporation, Silver Spring, Maryland (now NIRSystems). In 1975 the ADA[®] was used for all testing involved with the segregation program. It was located in Winnipeg, and all samples, primary and unload, were sent to Winnipeg for testing. The Kjeldahl laboratory in Calgary was closed, and a new laboratory established in Vancouver, British Columbia. The laboratories in Vancouver and Thunder Bay were used to establish the on-site NIRR system. During 1975 - 1976 NIRR testers were located in all terminal elevators. The country elevator primary samples were replaced with "Early" samples, taken during the first minute of unloading rail-cars. The official unload sample remained the same, and remained the result upon which all statistical analysis is based.

The on-the-spot testing, with the improved accuracy and reliability of sampling, saw an improvement in the overall error of the segregation program. The Early samples represented the first minute or so of unloading, but a sampling error persisted, since in the case of hopper cars, the unloading pits of some elevators were unable to accommodate all four hoppers of the cars without moving the cars. Monitoring at the terminal ports was based on samples sent from the elevators to the laboratories, six per shift from Vancouver and three from Thunder Bay. The reason for this was that there were 15 terminals operating at Thunder Bay at that time, and only six at Vancouver. At times when the terminals worked up to three shifts per day, six samples per shift per elevator, in addition to monitoring cargo-loading samples would have created an impracticable workload in Thunder Bay.

Responsibility for monitoring protein still rested with the GRL. In 1978 KjelFoss automated Kjeldahl equipment was acquired for on-the spot monitoring of all NIRR testing at both ports. The GRL retained responsibility for the overall accuracy of the programme, and still retains responsibility for reference testing by Kjeldahl.

The GRL is also responsible for evaluation of new NIR instruments, and was able to advise the CGC Inspection division of the benefits of using whole-grain Near-infrared Transmittance (NIRT) instruments in 1982, following extensive evaluation of Trebor instruments. Despite the difficulties in maintaining accuracy in the original Trebor-90 NIRT analyzers, the advantages of not having to grind samples were immediately obvious, and the overall error improved slightly.

In 1988, the GRL received the first Tecator whole-grain NIRT analyzer for evaluation, and two years later the CGC Inspection section replaced all terminal elevator instruments with Tecator InfraTec odel 1225 analyzers. In 1992 the InfraTecs were also used for testing the Official Rail-car Unload samples at the terminals. The faithful ADA was retired, after working without a break, 24 hours a day, 7 days a week, for 18 years, during which it completed over 11 million tests for protein and moisture, without once breaking down.

Using the InfraTecs for both Early and Official Unload samples the overall error of the segregation programme reached a low level which would not have been possible with reflectance ground-grain analyzers, due mainly to the elimination of sample preparation error. The CGC still uses Tecator NIT instruments for testing both the Early (sometimes called "half-way") and Official Unload samples. Research to date has shown that whole-grain reflectance (NIRR) instruments can achieve the same degree of accuracy as whole-grain NIRT instruments, but a successful bench-type NIRR whole-grain analyzer has not yet achieved widespread acceptance.

No more time or space will be used to describe the principles of NIR technology in this paper, since enough has been written about it already. The technology has revolutionized grain-handling operations which involve protein-testing, since it is fast enough to enable on-the-spot testing of rail-cars and farmers' trucks, without causing delays.



Several questions pose themselves, and should be addressed. These include:

- X 1. What are the main sources of error in NIR testing in the field (e.g. at grain terminal elevators)?
2. Where will NIR technology fit into the future of grain-handling in western Canada?
3. What new instruments are available, or "in the pipeline", and how will these help?
4. How likely is it that NIR or NIT whole-grain instruments will be officially used to test grains and seeds for moisture in western Canada?

To answer these questions in sequence:

- X 1. Although the NIT instruments appear simple to use, there are more than 40 sources of error in a NIR or NIT test, less in whole-grain analyzers, since the errors associated with grinding the sample and loading a sample cell are eliminated. Sources of error can be divided into instrument sources, sample sources and operator sources⁹.
 - X a). Instrument sources. These include temperature, relative humidity, noise, stray light, lamp failure, and other features of the instrument. Modern NIR/NIT instruments are designed and assembled so that they are more or less immune from the noise and stray light problems. Only the Tecator InfraTec has shown itself capable of being tolerant of temperature fluctuations. In the InfraTec these can be overcome during the calibration. Lamp failure is usually easy to diagnose, because the sample will not be analyzed at all.
 - X b). Sample sources. The most important of these are moisture and foreign material, particularly small seeds. Moisture changes the characteristics of the grain, and calibration has to include samples with the full moisture range anticipated. Small seeds fill the interstices between grains, and make the sample appear more dense to the instrument. Errors of up to 2 - 3 % absolute protein content can occur. The sample should be at least roughly cleaned before analysis at delivery points. This can be achieved by simply passing the sample over a buckwheat sieve to remove small seeds, and hand-picking large items such as wheat heads and pieces of straw.
 - X c). Operator sources. These include correct use of check samples, lack of knowledge of the technology, boredom, carelessness, and simple aversion to do the protein test. Check samples, the protein content of which has been verified by a reference method are essential to continued accurate operation of a NIR or NIT instrument. Failure to use a check sample or samples means that the operator can not know how well the instrument is working. Lack of knowledge is rife among many on-the-spot users, mainly because no-one takes time to train them properly. It is a true saying that when you know how to do something well, you do it well. Boredom is rarely a factor at a delivery point, because there is so much to do, and not much time to do it in. Carelessness is more important, and goes hand-in-hand with aversion to do the protein test - it is just another chore, added to all of the important things that have to be done with a producer's delivery of wheat.

2. The western Canadian grain-handling system has been charged with doubling throughput by the year 2005. ***This will be impossible without NIR technology.*** Research underway at the CGC is aimed at development of a complete electronic grading system, which will be capable of providing a grade and composition data on at least the most important grains and seeds. The "ultimate" near-infrared testing instrument will enable farmers to identify themselves to the instrument at a country elevator, process their own sample, then unload the grain. During unload the elevator manager will take the unloading sample, and process it in the same machine. The results for farmer and elevator sample should agree. The instruments will be capable of being networked and calibrated via modem and accuracy will be able to be controlled from the head offices of the grain elevator company.

Research already in process on the development of NIR instruments and calibrations for electronic grading and testing will enable grain to be graded and tested at the farm, so that the right grain and grade can be brought forward to an elevator system which is dwindling in numbers and flexibility in bin availability, and increasing in the distance between elevators.



Ideally grain should be tested before it is even binned at the farm. The new generation of instruments in process of development is aimed at making this reality. This is an entirely new concept of grain-handling, and will depend partly on reduction of the number of classes and grades of wheat. Near-infrared technology is already an important part of grain-handling in western Canada, but is used only for protein-testing. Its employment as a means of grading as well as analysis would greatly streamline grain-handling in the country.

3. New instruments include Diode Array and Acousto-Optical Tunable Filter instruments. Both are very fast, and lend themselves to grain-handling operations. For example, it would be possible to monitor grain grade and composition on a moving belt with either device. The Perten DA-7000 is a diode array device that is now commercially available. The AOTF instrument is in its final stages of development. Work is in progress on evaluation of these instruments for durability, transferability of calibrations, and other aspects which are important in long-term grain-handling. The monochromator, typified by the Tecator InfraTec has proven to be reliable over long periods, and the calibrations are transferable.

Development of new software is keeping pace with development of new instruments. The latest additions include Neural Network calibrations, which enable prediction of moisture in any type of grain, *using the same calibration*. Preliminary evaluation at the GRL has provided encouraging results for Canadian grains. A similar calibration is available for the prediction of protein content. Another innovation is the concept of "Nearest Neighbour", or "Local" calibration, offered by InfraSoft International, Port Matilda, Pennsylvania. This innovative software enables the prediction of composition in unknown samples based on the calibration of an operator-stipulated number of the spectra most similar in characteristics to that of the new sample.

4. Eventually NIR or NIT instruments will likely be used for moisture testing in western Canada. Calibrations are being developed for prediction of moisture in some grains. These will need evaluation over at least two seasons, and further testing to determine the influence of temperature, etc.

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Appendix: The CNA Procedure practiced at the CGC/GRL:

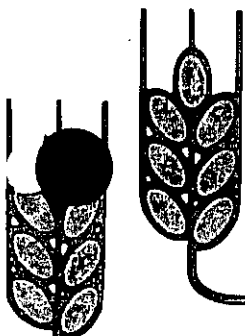
The instrument is calibrated against 150 mg of EDTA (usually - the actual weight is flexible, as long as it is weighed accurately). Samples of grain are ground in a U-D Cyclone grinder, fitted with a 1.0 mm screen, and are analyzed as received. Sample weight for analysis is 250 mg. Again, the weight is flexible, provided that it is accurately recorded, but the standard error per test increases with sample weights of less than 150 mg, while sample weights in excess of 300mg are difficult to handle. The sample is weighed into a piece of tin foil, and is then wrapped tightly in the foil, to exclude air. Weighed, wrapped samples are then loaded onto the carousel, and analyzed in sequence. Up to 34 samples can be loaded onto the carousel. Results are expressed on a constant moisture basis, either 13.5% or moisture-free. Moisture is determined on all samples by the AACC Approved Method No. 44-15A. We are developing calibrations for all frequently-analyzed materials on the NIRSystems Models 5000 and 6500 for moisture.

This is the method. The procedure for employing the method here includes:

1. Set the instrument to "wake up" - this is computer-controlled
2. Run up to 20 blanks, until the instrument is stabilized - this happens before the staff arrives. Calibrate the blank level
3. Calibrate with 6-8 EDTA samples. EDTA contains 9.59+/- 0.02% nitrogen. The EDTA is dried overnight at 100 degrees C and cooled before use
4. After calibration run 2-3 EDTAs to check accuracy
5. Test CWRS and CWAD check samples
6. Test precision samples (12) in duplicate twice a week
7. Test "routine" samples (up to about 120 per day - each test takes about 3 minutes)
 - a). Tare a piece of tin foil and transfer weight to the instrument
 - b). Add approximately 250 mg of ground sample (U-D Cyclone grinder, with 1.0 mm screen)
 - c). Tightly twist sample into the foil by hand, to make a pellet
 - d). Weigh the pellet and transfer the weight to the instrument
8. Test PC (Protein Check) every 20 samples
9. Test every 10th sample in duplicate

Maintenance is carried out every day according to the instrument software. Further maintenance is carried out periodically according to the Manufacturers' manual.

The coefficient of variability (our measure of analytical precision) is normally about 0.6% of the mean, as compared to about 1.2 % for the Kjeldahl method.



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Testimony of North Dakota Grain Dealers Association on HB 1359
House Agriculture Committee – Rep Dennis Johnson, Chairman
Presented by Steve Strege, Executive Vice President – January 27, 2011

Good morning Mr. Chairman and members of the House Ag Committee. My name is Steve Strege. I am the Executive Vice President of the North Dakota Grain Dealers Association. We are here today in opposition to House Bill 1359.

The bill adds protein testers to the list of “weighing or measuring devices” in 64-02-01(5). Then in 64-02-02, copy attached, we read that all such devices “must be supervised and controlled by the commission.” That is the Public Service Commission.

On the backside of this testimony is a copy of the Resolution adopted at our convention in Fargo last week. It lays out the reasons why we must oppose this bill. The Federal Grain Inspection Service is the national authority on protein measurement; ND law requires grain be purchased under federal standards; there’s already a procedure in state law to resolve disputes; having more than one “authority” on protein testing will lead to more, not less, variation.

FGIS master calibrations are determined at its Kansas City Tech Center. From there they go out to the FGIS Field Offices such as the one in Grand Forks. The next step is to the licensed inspection agencies such as those in Minot, Jamestown Grand Forks and Fargo. The market follows FGIS protein. It is not always perfect. But that is the guiding star. If PSC steps in with a second guiding star, which one are we to follow. If the PSC tells us to raise our meters to a higher protein level and we buy grain based on that level and sell it at a loss based on the FGIS and market level; who will make up the difference?

Last week I asked the PSC Licensing Division how many grain dispute complaints they were getting. I was told that since July 2009 there were 12 complaints and that only two of them dealt with protein. That is even more incredible when you consider that the 2009 crop was low protein. The Interim Ag Committee discussed that at a January 2010 hearing in Fargo. But the concern was not about the measurement of protein. It was about the discounts for having low protein wheat.

Mr. Chairman there are a couple grain elevator managers in the room who have additional comments. I will try to answer any questions.

Resolution on Protein Testing
January 18, 2011 – NDGDA convention in Fargo

Whereas, state legislation proposes to have the North Dakota Public Service Commission involved in testing and perhaps calibrating grain elevator protein testers, and

Whereas, the Federal Grain Inspection Service is the final authority on protein testing, and

Whereas, NDCC 60-02-27 specifically says warehousemen will purchase grain in accordance with federal grade standards (*Protein in not a grade factor, but this section of the NDCC clearly accedes to federal tests and measurements.*) and

Whereas, there is a procedure under state law 60-02-05 and 60-02.1-05 to settle any protein measurement dispute by an official lab or mutually agree-upon third party, and

Whereas, having more than one “authority” on protein testing will lead to even more variations in results and monetary losses for grain elevators if they are forced to buy on one standard, but sell on another,

Therefore Be it Resolved the North Dakota Grain Dealers Association opposes legislation of this kind.

CHAPTER 64-02

WEIGHING AND MEASURING DEVICES

64-02-01. Definitions. In this title:

1. "Calibrate" means to compare a standard, or weighing or measuring device, to another standard and eliminate by adjustment any variation in the accuracy of the item being compared, but does not include the field repair of a weighing or measuring device.
2. "Commission" means the public service commission.
3. "Test" means to measure to determine if a standard or weighing or measuring device is within the permitted tolerance.
4. "Transient vendor" means a wholesale or retail seller of produce, fruit, nuts, or seafood that sells to the public at a temporary location, on a seasonal basis, open less than one hundred twenty business days each year.
5. "Weighing or measuring device" means any scale, weight, measure, instrument, or device used or offered for use for weighing or measuring in commerce.

64-02-02. Weights and measures - Supervision by public service commission - Installation of weighing or measuring devices under special variance permit. All weighing or measuring devices in this state must be supervised and controlled by the commission. A variance permit for the installation or relocation of a device deviating from requirements under this chapter may be issued by the commission when the device meets service requirements within accepted tolerances. The commission may request that an application for a variance permit include complete construction plans and a statement of the specific reasons why deviations are necessary or desirable. The commission may impose limitations or conditions on the construction and use of any weighing or measuring device.

64-02-03. Commission rules. The commission may adopt rules having the force and effect of law.

64-02-04. Tolerance - Uniformity established by commission. The commission shall establish uniform tolerance or reasonable variances for weighing and measuring devices.

64-02-05. Employees - Compensation. The commission shall employ and fix the compensation of employees necessary to carry out the provisions of this title.

64-02-05.1. Director of weights and measures. Repealed by S.L. 1989, ch. 764, § 31.

64-02-06. Employees of department shall give bond. Repealed by S.L. 1989, ch. 764, § 31.

64-02-07. Duties of commission. The commission shall:

1. Maintain the calibration of the state weights and measures standards that are traceable to the United States standards. All secondary standards must be calibrated by a national institute of standards and technology-recognized metrology laboratory as often as the commission deems necessary.
2. Keep a seal to impress the letters "N.D." and the date of sealing upon the weighing or measuring devices that are sealed.
3. Test, correct, and seal, when found to be accurate, all the copies of the standards used in the state for the purpose of testing the weighing or measuring devices used in the state, and keep a record thereof.

Testifying in opposition of HB 1359 (Protein Analyzers)

House Ag Committee – Rep Dennis Johnson, Chairman

Presented by Dan DeRouchey, January 27th, 2011

Good Morning Mr. Chairman and members of the House Ag Committee. My name is Dan DeRouchey, I manage the Berthold Farmers Elevator LLC at Berthold North Dakota and have been in that capacity for the last 24 years. Our primary grains that we buy and sell are wheat and barley. We also handle many other grains grown in a four county area.

Accuracy in protein testing has come a long way over the past 20 years and the procedure to make sure the producer gets a fair shake is already in place. As new technology and procedures have advanced most elevators have invested in the latest and best technology. They have the same analyzers as the Federal Grain Inspection points. Calibrations are set to FGIS standards to ensure accuracy for both the producer and the elevator. We have already heard that there is a sound practice in place. The producer has the option to have a FGIS lab or mutually agreed upon third party test for protein content. That is state law. It is posted in every elevator and attached to my testimony. Our elevator keeps the sample for 7 days after unload, if either the farmer or the elevator wants FGIS test done on the sample, it will be sent to Minot Grain Inspection and settled on their results.

According to Federal Grain Inspection, protein tests can vary up to .4 of 1%, but should be within .1 on the average. So, if a sample is high or low by .4, it is still considered to be within the acceptable range of variation. Grain temperature can also affect testing accuracy as well as extremely high moisture. My point is, variation will always be a part of grain testing and having a procedure for resolving grain grading disputes as we have now in place will keep the business on a fair and equitable basis.

Thank you, if you have questions I will try to answer them.

PROCEDURE FOR RESOLVING GRAIN GRADE DISPUTES

De Rocheley
Dan
#6

60-02-05. Grain marketing - Procedure for resolving disputes.

1. If any dispute or disagreement arises between the person receiving and the person delivering grain at any public warehouse in this state as to the proper grade, dockage, vomitoxin level, moisture content, or protein content of any grain, an average sample of at least three pints of the grain in dispute may be taken together by both parties interested. The sample must be certified by each party as a true and representative sample of the grain in dispute on the day the grain was delivered. The sample must be forwarded in a suitable container by parcel post or express, prepaid with the name and address of both parties for inspection by a federal licensed inspector, or a mutually agreed upon third party, who will examine the grain and adjudge what grade, dockage, vomitoxin level, moisture content, or protein content the sample of grain is entitled to under the inspection rules and grades adopted by the secretary of agriculture of the United States. The person requesting the inspection service shall pay for the inspection. If the grain in question is damp, otherwise out of condition, or if moisture content is in dispute, the sample must be placed in an airtight container. Payment for the grain involved in the dispute must be made and accepted on the basis of the determination made by the federal licensed inspector or third party. However, all other quality factors may also be considered in determining the price of the grain. An appeal of the determination made by a third party other than a federal licensed inspector may be made to a federal licensed inspector. An appeal of the determination made by a federal licensed inspector may be made as provided under the United States Grain

Standards Act [Pub. L. 103-354, 108 Stat. 3237, 7 U.S.C. 79(c) and (d)] and under 7 CFR 800.125-800.140. A person not abiding by a final determination is liable for damage resulting from not abiding by the determination.

2. If any dispute or disagreement arises between the person delivering grain and the person receiving grain as to the determination of quality factors of grain purchased or delivered in the state for which inspection rules and grades have not been adopted by the secretary of agriculture of the United States, an average sample of at least three pints of the grain in dispute may be taken together by the parties interested. The sample must be certified by each party as a true and representative sample of the grain in dispute on the day the grain was delivered. If the grain is damp or otherwise out of condition, the sample must be placed in an airtight container. The sample must be forwarded in a suitable container by parcel post or express, prepaid with the name and address of both parties, for inspection by a federal licensed inspector, or a mutually agreed upon third party, who may examine the grain and determine the quality factors in dispute. The person requesting the inspection service shall pay for the inspection. The determination made by the inspector, or the third party, must be used in the settlement of the dispute.

Officially licensed inspection agencies in North Dakota include:

Grain Inspection, Inc.
PO Box 1652
314 12th Avenue NW
Jamestown, ND 58402
(701) 252-1290
Fax: (701) 252-1298
E-mail: grain@buffalocity.net

Grand Forks Grain Insp. Dept., Inc.
PO Box 5639
Grand Forks, ND 58206-5639
(701) 772-0151
Fax: (701) 772-7948
E-mail: gfginspection@qwest.net

Minot Grain Inspection, Inc.
PO Box B
Minot, ND 58702
(701) 838-1734
Fax: (701) 838-3782
E-mail: mgins@minot.com

ND Grain Inspection Service, Inc.
1601 7th Avenue North
Fargo, ND 58102
(701) 293-7420
Fax: (701) 241-8818
E-mail: ndgi@graininspection.com

Additional service points in North Dakota include:

Grand Forks Grain Insp. Dept., Inc.
PO Box 760
Devils Lake, ND 58301
(701) 662-2142
Fax: (701) 662-2108
E-mail: gfgidl@stallarnet.com

ND Grain Inspection Service, Inc.
PO Box 123
Enderlin, ND 58027
(701) 437-3000 ext. 202
Fax: (701) 437-2923
E-mail: ndgisi@mlgc.com

Grand Forks Grain Insp. Dept., Inc.
PO Box 37
Gladstone, ND 58630
(701) 225-2268
Fax: (701) 225-2269
E-mail: gfgi@aol.com
*Mail to either address

Call the Public Service Commission
Licensing Division at 701-328-4097 to
receive a copy of this procedure or
see our website: www.psc.state.nd.us

May 2003

Wheat Train

Reynolds United

01/25/2011

Car #	Our Protein	Fargo Protein	Our TW	Fargo TW	Our Moist	Fargo Moist	TD	WEIGHT	POSTED WEIGHT
FURX 832172	12.10	12.00	62.20	63.10	13.00	12.90		207,300	207,300
BNSF 431868	12.10	12.00	62.80	63.70	12.80	12.90		206,895	206,900
BN 467771	12.50	12.60	62.50	63.10	13.00	12.90		221,800	221,800
FURX 830066	12.20	12.30	62.90	63.10	13.00	13.00		205,900	205,900
ATW 319575	12.20	12.00	62.50	63.00	12.80	12.90		223,495	223,500
BN 471728	12.20	12.30	62.70	62.80	12.70	12.90		222,595	222,600
BNSF 466220	12.40	12.30	62.00	62.90	13.00	12.80		221,600	221,600
BN 448451	12.30	12.20	63.00	62.90	12.80	12.80		204,495	204,500
BNSF 429770	12.20	12.40	62.50	62.90	12.80	12.90		207,000	207,000
BNSF 470152	12.40	12.30	62.00	62.70	12.80	12.80		222,400	222,400
BNSF 428065	12.20	12.20	62.10	62.80	12.90	12.00		206,395	206,400
BNSF 436245	12.10	12.00	62.20	62.80	12.50	12.60		203,000	203,000
BNSF 434921	12.50	12.30	62.70	62.70	12.60	12.60		202,600	202,600
BNSF 424630	12.20	12.10	61.70	63.00	12.60	12.80		204,800	204,800
ATSF 313074	12.10	12.10	62.20	62.90	13.00	12.60		209,500	209,500
BNSF 469000	12.20	12.40	62.60	62.60	12.80	13.00		222,400	222,400
BN 448702	12.10	12.00	61.80	62.70	12.90	12.90		205,595	205,600
FURX 823012	12.20	12.10	61.90	62.70	12.80	13.10		205,500	205,500
BNSF 432884	12.10	12.00	62.60	62.80	12.90	12.80		203,700	203,700
BN 448296	12.20	12.10	62.30	62.80	12.80	12.60		205,895	205,900
BN 472375	12.00	12.20	62.10	62.80	12.90	12.70		222,695	222,700
NOKL 832436	12.00	12.20	62.50	62.80	12.70	12.90		205,500	205,500
NDYX 830625	12.10	12.30	62.50	62.90	12.90	12.80		205,095	205,100
BN 471482	12.20	12.10	63.30	63.00	12.90	12.70		222,500	222,500
BN 452525	12.30	12.30	62.60	62.90	12.80	12.80		203,400	203,400
BN 448390	12.20	12.20	61.70	62.70	13.00	13.10		206,000	206,000
FURX 830098	12.10	12.00	62.70	62.70	12.90	13.00		206,470	206,500
	12.2000	12.185	62.39		12.84	12.81		94,742.08	94,743.3

#7
 461359
 1/27/11
 Paul Cappin

House Bill 1359

Presented by: Patrick Fahn
Compliance and Competitive Markets Division
Public Service Commission

Before: House Agriculture Committee
Honorable Dennis Johnson, Chairman

Date: January 27, 2011

TESTIMONY

Mister Chairman and committee members, I am Patrick Fahn, Director of the Compliance and Competitive Markets Division of the Public Service Commission. The Commission asked me to appear today to share some of the Commission's major concerns about House Bill 1359.

House Bill 1359 amends the definition of a weighing or measuring device under North Dakota Century Code chapter 64-02 to include any instrument used at a public warehouse or facility to measure the protein content of grain. Chapter 64-02 gives the Commission authority to supervise and control all weighing and measuring devices in the state and establish uniform tolerance or reasonable variances for weighing and measuring devices.

The Commission tests weighing and measuring devices but does not currently test grain protein content analyzers. Further, the Commission's weights and measures program inspectors test weighing and measuring devices for accuracy but do not make adjustments to the devices to eliminate inaccuracies.

In addition, current provisions in the Commission's grain warehouse and grain buyer licensing laws, specifically North Dakota Century Code sections 60-02-05 and 60-02.1-05, provide a mechanism for resolving grain protein content disputes. We have no reason to think the dispute resolution mechanism is not working.

As we understand the protein analyzer testing procedures set forth in the 2011 Edition of Handbook 44 published by the National Institute of Standards and Technology, five samples per grain type or class would be used to check instrument performance. The Commission would have to procure grain samples for each grain type. Each sample is analyzed once. One of the samples is analyzed an additional four times to test instrument repeatability. We also understand that, for certain types of grain analyzers, calibration slope adjustments can only be made by the manufacturer or the manufacturer's designated service agency.

As you can see, testing and calibrating protein content analyzers for approximately 400 elevators in North Dakota, some of which may have more than one analyzer, will involve a substantial amount of resources. If the Commission is to take on this additional function, we estimate needing an additional FTE in the weights and measures program. We estimate needing \$225,000 per biennium for salaries, benefits, and operating expenses plus approximately \$60,000 for a set of protein analyzers and additional dollars if grain samples must be procured.

As mentioned above, we believe there is a satisfactory mechanism now for resolving grain protein content disputes. A grain sample taken together by both parties would be measured for protein content by the protein analyzer in question. The sample would then be protein tested at a lab that is certified under the United States Department of Agriculture (USDA), Grain Inspection, Packers and Stockyards Administration (GIPSA) Federal Grain Inspection Service's (FGIS) Official Grain Inspection and Weighing System. In North Dakota, there are ten locations where samples may be tested by a GIPSA certified lab. The charge for a protein test of wheat is approximately \$7.00.

Mister Chairman, this concludes our testimony. I will be happy to answer any questions you may have.

Overview of Selected State Laws Regarding Emergency Access to Epinephrine

State	Summary of Law
Alaska	Permits <u>any individual</u> \geq 18 yrs. to obtain a prescription, purchase, and be held harmless for administering epinephrine to another if the individual has completed a state-approved training program on how to recognize symptoms of severe asthmatic or allergic reactions, the standards for storing and administering epinephrine, and emergency follow-up procedures. <i>Alaska Stat. §17.22 et. seq.</i>
Arkansas	Allows <u>individuals</u> \geq 18 yrs. with <u>responsibility for at least one other person</u> to obtain a certificate that allows them to receive a prescription from a physician for premeasured doses of epinephrine and the necessary paraphernalia for administration, and to administer epinephrine to persons suffering a severe adverse reaction to an insect sting or other allergic reaction when a physician is not immediately available. <i>Ark. Code §§ 20-13-402 – 20-13-407</i>
California	Permits <u>pharmacies to furnish epinephrine auto-injectors to a school district</u> or county office of education pursuant to a written order from a physician and surgeon. Elementary and secondary schools may determine whether or not to make epinephrine auto-injectors and trained personnel available; also permits school nurses or other trained individuals to obtain a prescription for epinephrine auto-injectors from a designated physician. <i>Cal. BP Code § 4119.2</i>
District of Columbia	Authorizes <u>schools to procure medication</u> for the treatment of asthma, anaphylaxis, or other illness <u>for use in emergency circumstances</u> . Trained school personnel may administer the medication to any student in an emergency (the student is not required to have a known diagnosis or a medication action plan to receive treatment in emergency circumstances). <i>DC Code § 38-651.06</i>
Florida	Authorizes trained individuals over 18 who have responsibility for another person to possess and administer epinephrine to individuals who have severe allergic reactions to <u>insect stings</u> . <i>Fla. Stat. § 381.88</i>
Kansas	Allows for any person to administer epinephrine to a student or staff member believed to be exhibiting signs and symptoms of an anaphylactic reaction. Also permits schools to maintain a stock supply of epinephrine with physician and pharmacist oversight. <i>Kan. Stat. § 65-2872b</i>
Maryland	Allows anyone \geq 18 yrs. of good moral character, with responsibility for other person as a result of their occupation or volunteer status, who has successfully completed an educational training program approved by the Department of Health and Mental Hygiene to obtain a prescription for a pre-measured dose of epinephrine and be permitted to administer to a person believed to be suffering from a severe adverse reaction to an <u>insect sting</u> . Training must be renewed annually. <i>MD Code Health – Gen. §§ 13-701 to 13-709</i>

State	Summary of Law
Missouri	School boards may authorize a <u>school nurse</u> to maintain an adequate supply of prefilled auto syringes of epinephrine with at the school. The nurse has discretion to use the epinephrine on any student believed to be experiencing a life-threatening anaphylactic reaction. MO Rev. Stat. 167.630
New York	Permits prescription, purchase, and administration of emergency epinephrine by all classes of emergency medical technicians, camps, and other entities at the discretion of the Commissioner of Health. January 2010 New York State Department of Health regulation further requires that all ambulances be equipped with epinephrine auto-injectors. New York Public Health Law § 3000-c
North Dakota	Provides that the state health officer may adopt rules to authorize lay persons to administer epinephrine to person having a severe allergic reaction to <u>insect stings</u> . ND Cent. Code § 23-01-05.2
Oregon	Permits a person ≥ 21 years of age who has completed training regarding responses to severe allergic response to insect stings and other specific allergens to obtain a prescription for premeasured doses of epinephrine and necessary administration paraphernalia and to administer the prescribed epinephrine to any person suffering from a severe allergic response when a licensed healthcare professional is not immediately available. Applicants must have responsibility for or contact with at least one other person through their occupational or volunteer status. Or. Rev. Stat. § 433.800-.830
South Carolina	Authorizes the Department of Health and Environmental Control to establish a program for training and certifying individuals with responsibility for at least one other person because of occupational or volunteer status – to administer treatment, including prescribed epinephrine, in an emergency situation to persons suffering an adverse reaction to an <u>insect sting</u> . SC Code Ann. § 44-99-10
Utah	Permits persons ≥ 18 years of age who complete specified training and meet certain criteria to obtain a prescription for, possess, and use an epinephrine auto-injector to treat life-threatening cases of anaphylaxis. Each primary and secondary school, public and private, must provide initial and annual refresher training and make at least one epinephrine auto-injector available to any teacher or school employee who volunteers to become a qualified person. Other qualified adults who are not school employees (<i>i.e., camp counselors, tour guides, forest rangers</i>) may become qualified persons if they can demonstrate occupational or family need. Utah Code § 26-41 et. seq.

chicagotribune.com

Seventh-grader dies of food allergy at Chicago school

By Noreen S. Ahmed-Ullah, Tribune reporter

8:26 PM CST, December 20, 2010

Chicago Public Schools sent grief counselors to Edison Regional Gifted Center on Monday after the death of a seventh-grader who had an allergic reaction to food she ate at school.

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Katelyn Carlson, 13, of the Sauganash neighborhood, was rushed from the Albany Park school at 4929 N. Sawyer Ave. to Swedish Covenant Hospital on Friday afternoon and transferred to Children's Memorial Hospital, where she died of anaphylaxis, a severe reaction to a food allergy, according to Fire Department officials and the Cook County medical examiner's office.

CPS officials said they were conducting an investigation and could not provide details. Two parents of other students said they had been told by school officials that Katelyn had a severe allergic reaction to peanut oil from Chinese food ordered from a restaurant for a class party.

Matthew Akinrinade, whose daughter was a classmate and close friend of Katelyn's since kindergarten, said his daughter also has a peanut allergy and assured him earlier last week that a teacher had called the restaurant several times to make sure peanuts would not be used in the food. Akinrinade said his daughter did not have a reaction to the food Friday, but she saw that Katelyn was having trouble breathing.

According to the American Academy of Pediatrics, food allergies affect approximately 1 in 25 school-aged children, and 16 percent to 18 percent of children with these allergies have had a reaction in school.

Several Edison parents Monday called for schools to ban peanuts in any form and for classrooms to be equipped with EpiPens, the medical device used to inject a dose of epinephrine to treat allergic reactions.

CPS spokeswoman Monique Bond said the school system relies on individual student health profiles that contain information about a student's health issues and their prescribed medications to determine a course of action during a medical emergency. Students can be injected with EpiPens only if it is prescribed in their name and shows up on their individual student health profile, she said.

Jill Martensen, a former parent at Edison whose son was in Katelyn's class last year, said school policies need to be changed so that schools are equipped with EpiPens and they are administered to students in an emergency, regardless of what is on a student's health profile.

"In terms of saving lives, we need to change the policy," she said. "Schools' hands are tied. All they can do is call 911."

Funeral directors at Smith-Corcoran funeral home, where a wake was being held for Katelyn on Monday, said she was an honor student with a second-degree black belt in tae kwon do. She also loved playing basketball, soccer and fishing.

Monroy-Espinoza said her 7-year-old son, Cesar, was paired with Katelyn in a school buddy program and had just exchanged holiday gifts with her last week.

"She was very sweet, very friendly," Monroy-Espinoza said.

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