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ECONOMIC IMPACT ASSESSMENT

Developing an Internationally Accredited Private Laboratory and its Effects on the Georgian Hazelnut Industry

FINAL

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USAID ECONOMIC PROSPERITY INITIATIVE (EPI)

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ABSTRACT

Currently, Georgia lacks an internationally accredited laboratory to evaluate and test local produce prior to export. Tests conducted by existing local laboratories are not recognized outside of Georgia. As a result, Georgian hazelnut processors are unable to provide credible validation of their products' quality to international buyers. The result is international skepticism regarding Georgian quality. Only a small cadre of international buyers has the knowledge and risk tolerance to operate in such an environment. As part of EPI's mandate to serve as a catalyst to increase productivity and employment in export driven agricultural sectors, it is considering working with a local laboratory to assist it to obtain international accreditation.

To assess the potential benefit of such an endeavor, EPI contracted with Coldbrook Ventures LLC, a US based international consulting agency. Coldbrook Ventures LLC was tasked with assessing the potential economic impacts of developing a domestic internationally accredited laboratory for Georgia's hazelnut market. Thomas C. Beck, the EPI consultant, used both qualitative and quantitative methods to identify areas of potential impact and monetize the effects. The consultant found that an internationally accredited laboratory would spur economic expansion and quality improvements throughout the hazelnut sector. The existence of such a laboratory would also lead to higher productivity by increasing quality assurance. These changes would eventually enable Georgia's hazelnut sector to attain price parity with the hazelnuts of other nations.

ABBREVIATIONS

ANSI	American National Standards Institute
BoG	Bank of Georgia
CAGR	Compound Annual Growth Rate
COD	Cash on Delivery
EPI	Economic Prosperity Initiative
EU	European Union
EE	Eastern Europe
FOB	Freight on Board
GEOSTAT	Georgian National Statistics Office
FAO Stat	Food and Agriculture Organization of the United Nations Statistical Databases & Data Sets
USAID	United States Agency for International Development

CONTENTS

I. EXECUTIVE SUMMARY

Internationally accredited laboratories provide critical quality and safety validation to global agricultural markets. Currently, Georgia has no internationally accredited laboratory, and thus lacks the ability to validate the quality of Georgian agricultural products according to international standards. The lack of an internationally accredited laboratory negatively impacts the entire Georgian agricultural sector. For the purposes of this report, the consultant's analysis is limited to the hazelnut industry. The Georgian agricultural sector's inability to validate and demonstrate quality increases the perceived risk of trading internationally with Georgia, and risk adverse buyers are reluctant to consider Georgian products. International buyers compensate for the perceived risk of trading with Georgia by demanding lower prices. The result is that Georgian processors must sell their products at a discount.

To lower trading risk and support the growth of the Georgian hazelnut industry, EPI is considering working with a local laboratory to assist the laboratory in obtaining international accreditation. To better assess the potential economic impacts on the Georgian hazelnut market of developing such a laboratory, EPI contracted with Coldbrook Ventures LLC, a US based international consulting agency. Thomas C. Beck, the EPI consultant, used both qualitative and quantitative methods to identify the potential areas of impact and to monetize these effects.

The EPI consultant interviewed 14 Georgian hazelnut processors to determine their major challenges, conducted two focus groups with 25 farmers from three villages, and spoke with representatives from three international hazelnut buyers. The processors and buyers cited Georgia's lack of quality verification and its effective demonstration as negatively impacting the Georgian hazelnut industry.

Based upon these discussions and further analysis, the consultant determined that an internationally accredited laboratory in Georgia would support hazelnut processors in a variety of ways. A Georgian laboratory accredited to international standards, which maintains that accreditation, will produce universally recognized test results. These recognized tests would assure buyers of the hazelnuts' quality prior to shipment. With such assurance buyers would be willing to alter contract payment terms. An internationally accredited laboratory would also strengthen the financial and negotiating power of Georgian hazelnut processors in the international arena, and would support continuous quality improvements that will eventually lead to price parity.

During the course of the research, the EPI consultant conservatively quantified the monetary impacts on the Georgian hazelnut market for developing an internationally accredited private laboratory. The findings support the establishment of an internationally accredited laboratory, operating under the auspices of an international accreditation body, such as the American National Standards Institute (ANSI).

The consultant strongly recommends that EPI work with the identified local laboratory to assist in attaining international accreditation. The laboratory's internationally accredited testing capability should be aligned to the needs of the Georgian hazelnut sector. However, the laboratory is relevant beyond the hazelnut sector. Therefore, EPI should partner with the local laboratory to pursue accreditation for the most relevant and sustainable set of tests and methods. Doing so will enhance the utility and economic viability of the lab, while best

serving multiple value chains within the agricultural sector, effectively serving the most Georgian producers throughout the agricultural industry.

Having an accredited laboratory could ultimately improve productivity by 3% to 6% and increase annual export values by USD 7.5 million to USD 18.8 million annually in the hazelnut sector. As these annual impacts stem from a structural change, they can be considered in perpetuity, representing a monetary impact of somewhere between USD 57.9 million and USD 144.6 million.

II. BACKGROUND

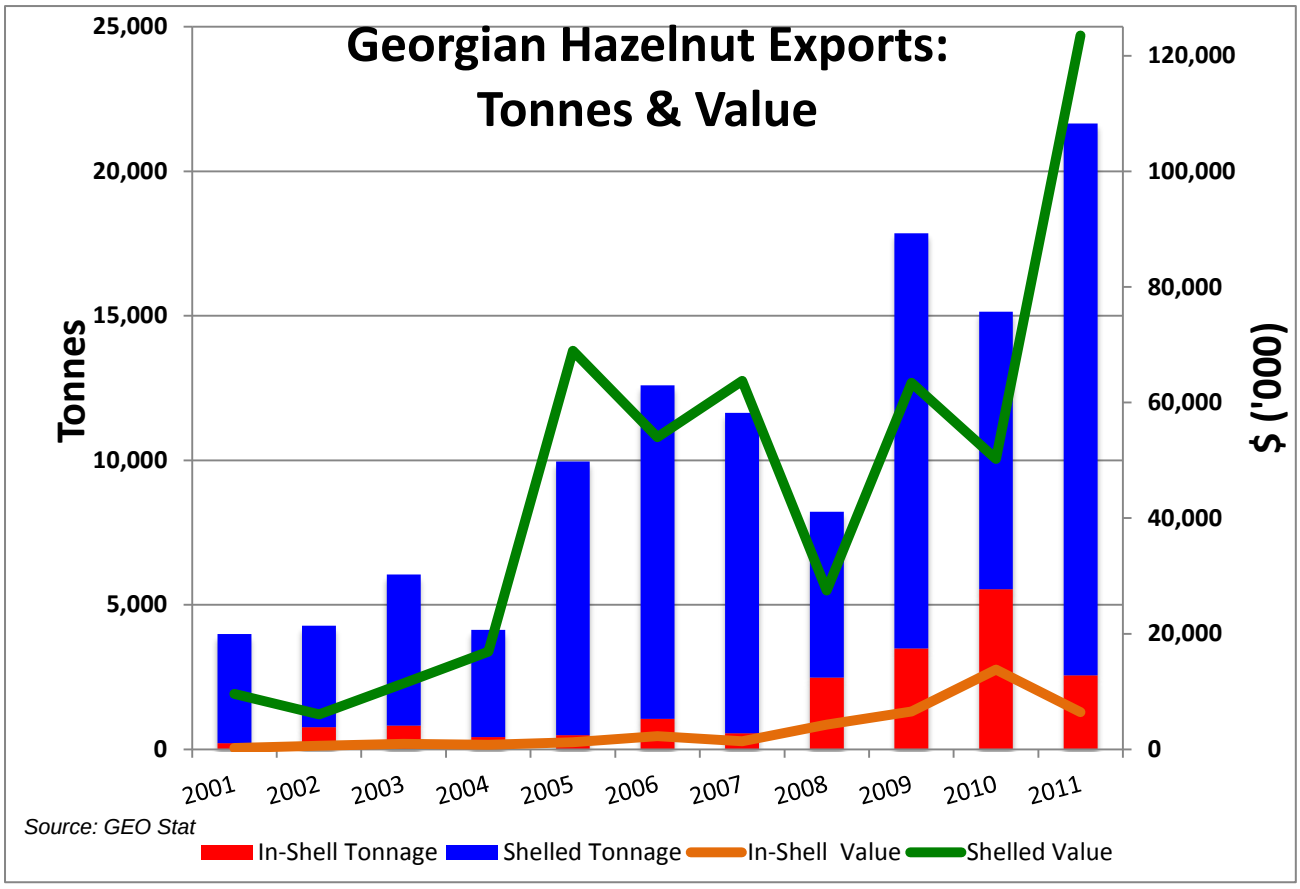
A. THE GEORGIAN HAZELNUT MARKET:

Hazelnuts are a mature commodity market where Turkey has been the dominant producer and supplier for decades. Georgia, ranking as one of the top five producers, is a significant, yet small, player in this hazelnut market. Georgia's production represents approximately 3% of the world tonnage according to 2010 data available through Food and Agriculture Organization of the United Nations Statistical Databases & Data Sets (FAO Stat).

In 2011, Georgia exported approximately 22,577 tones of hazelnut products. The largest component of these exports was shelled hazelnuts, at 19,093 tonnes. The total market value was approximately USD 130 million with the shelled segment accounting for USD 123.4 million.

Please find below Table 1 detailing the annualized data for Georgian in-shell and shelled exports for the past ten years. Note that the blue and red bars represent tonnes, whereas the green and orange lines represent value in USD.

Table 1



THE SHELLED MARKET:

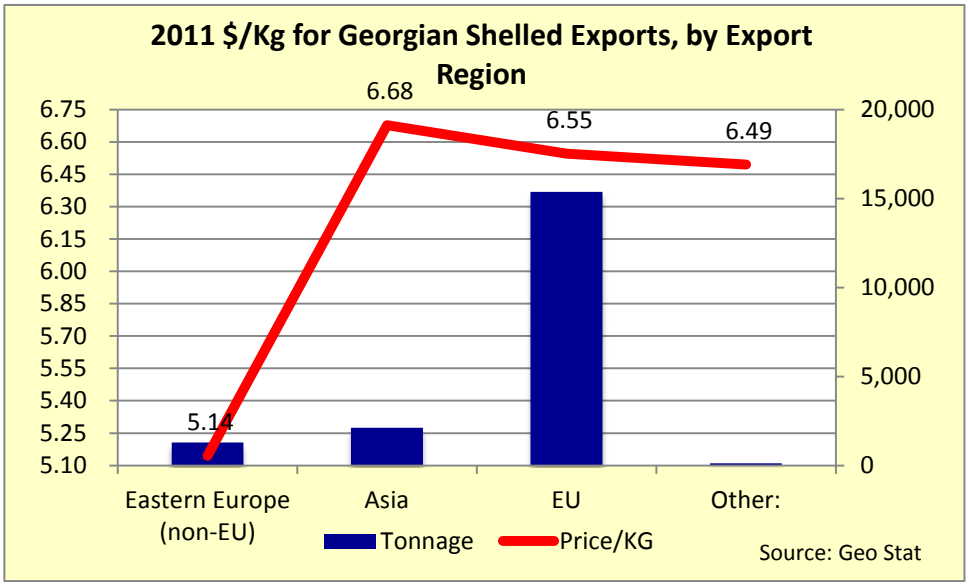
The Georgian shelled market, accounts for 93% of all Georgian hazelnut products sold, and would be the primary beneficiary of an internationally accredited laboratory. Therefore the report will only consider the shelled market.

The Main Shelled Hazelnut Export Markets:

In 2011, Georgia exported shelled hazelnuts to more than 30 countries. The countries can be divided up into four geographic areas: Eastern Europe (EE) excluding those EE countries that have joined the EU, Asia, The European Union (EU), and "Other." The EU is by far the largest export market for Georgian shelled hazelnuts, accounting for 81% on a tonnage basis, and 82% on a value basis.

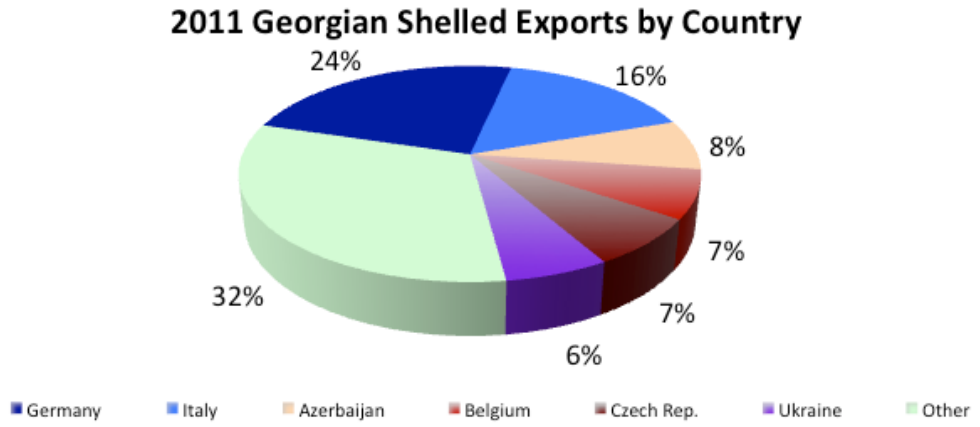
The Asian market has higher prices and tends to prefer the larger sized nuts, measuring 15+mm. The EU prefers sizes 9mm – 15+mm, and has strict quality standards. On the other hand, EE countries do not adhere to the strict standards of the EU countries, which may explain the lower prices of hazelnuts. Please see Table 2 entitled, Georgian Shelled Exports, for more information.

Table 2



The leading destinations for shelled Georgian exports are Germany and Italy, representing 40% of all shelled products, while the top four EU countries represent 54% of the market. Please find below Graph 1, entitled Georgian Shelled Exports by Country, depicting the percentage of shelled hazelnut exports by country.

Graph 1



B. HAZELNUT STANDARDS & TESTING:

The international hazelnut market is regulated by an established set of standards. These standards form an elaborate system of classifications, grades and tolerances, which are verified and demonstrated through a series of sensory as well as laboratory tests.

STANDARDS:

Hazelnuts are categorized and graded into classes and sizes with each class having specific characteristics and tolerances. These criteria are based on standards originally devised by Turkey and known as TS 3075 (See Appendix VI). The standards are recognized worldwide, although some countries and/or companies may have other criteria or requirements that they will specify (see Appendix VII for sample requirements). Many of the standards are determined through sensory tests such as appearance, taste, touch and or smell. Others, such as internal decay, are determined through a guillotine test, where the nuts are physically chopped to observe the incidence of internal mold or decay.

TESTING:

However, hazelnuts are also tested for food safety criteria in a laboratory setting. Before purchasing, international buyers often demand that the following be tested for: mycotoxins, such as aflotoxin; micro-biologicals, such as molds and other bacteria; humidity and or moisture content; heavy metals; and pesticides. Some key laboratory tests for hazelnuts are provided below in Table 3.

Table 3 - Physical-chemical characteristics

Analysisvariation	Analysis	Reportable name
MBK-COMSTANDARD	MBK-COM	sample Handling
EXTR-FFA-SEXTRACTION	EXTR-FFA-S	Extraction of fat for FFA
FFA-TI-DFFAEXTRAC	FFA-TI-D	Free fatty acids (FFA)
EXTR-PO-SEXTRACTION	EXTR-PO-S	Extraction of fat for PO
PEROX-TI-DV-PEANUTS	PEROX-TI-D	peroxide value
FATTO-GR-DFOODQ	FATTO-GR-D	Fat (total)

Heavy metals		
Analysisvariation	**Analysis**	**Reportable name**
PRP-D-IP-DDUPLOS	PRP-D-IP-D	unlocking metal
ARSEN-IP-DFOOD	ARSEN-IP-D	arsenic

CADMI-IP-DFOOD	CADMI-IP-D	Cadmium
COPPE-IP-DFOOD	COPPE-IP-D	copper
LEAD-IP-DFOOD	LEAD-IP-D	plumbum
MERCU-FI-DFOOD	MERCU-FI-D	mercury
ZINC-IP-DFOOD	ZINC-IP-D	zinc

Other parameters		
Analysisvariation	**Analysis**	**Reportable name**
AFLAN-HP-SNUTS	AFLAN-HP-S	Aflatoxine

Microbiology		
Analysisvariation	**Analysis**	**Reportable name**
APC-QNSTANDARD	APC-QN	Mesophilic aerobic bacteria count
COL-QNSTANDARD	COL-QN	Coliforms
ECO-QNSTANDARD	ECO-QN	Escherichia coli
SAL-VI-QLSTANDARD	SAL-VI-QL	Salmonella
YM-SEP-QNSTANDARD	YM-SEP-QN	Yeast and molds

As aflotoxin is carcinogenic and highly toxic, it is closely regulated with specific maximum levels for export. In addition, heavy metals and pesticide residues are also tightly regulated.

EU Regulations:

EU legislation requires aflotoxin testing and mandates that EU customs' authorities test a certain percentage of all imported hazelnuts from Turkey for aflotoxin. That percentage was as high as 20% in 2006, but was reduced to 5% in 2012.

In October of 2011, Azerbaijan was added to the list of countries of origin for the mandatory testing by EU customs' officials. At present, the percentage is 10% of all shipments from Azerbaijan.

These regulations are in addition to the EU requirement that all hazelnuts from Turkey and Azerbaijan be tested in a laboratory prior to shipment. Georgian hazelnuts are not currently subject to the same customs and pre-shipment testing requirements.

In addition to aflotoxin, EU customs monitor shipments to ensure compliance with the EU tolerances set for pesticide residues, heavy metals, and biological contaminants. These rules are constantly being evaluated and updated.

EU based buyers believe and anticipate that Georgia will be subject to additional customs testing and or pre-shipment testing in the future. In support of this view, the EPI consultant found that, according to the EU's Rapid Alert System for Food and Feed (RASFF), one Georgian shipment was destroyed for pest infestation in 2011 and five notices were received in 2012, including two border rejections. Recent information from an EU official also supports the buyers' belief. The EU official indicated that during the past four months, EU customs' officials have blocked and detained an increased number of Georgian shipments. Although the EU official did not provide exact figures and details, the official felt that given Georgia's small position in the world market, the number of problem shipments is a significant concern.

Any food item, rejected at the EU border, is detained and then, depending on the severity of the infraction, will be destroyed, reprocessed on site to bring the food into compliance, or sent to an alternative destination.

C. THE ROLE OF THE LABORATORY

Laboratories provide critical quality and safety validation in the marketplace. The buyer uses a lab to ensure a purchased shipment complies with local regulations, meets required quality levels, and is safe for consumption. Buyers subject a shipment to aflotoxin and other laboratory testing prior to acceptance. The potential risk and liability to the buyer requires he/she take significant measures to ensure safety and compliance in order to avoid problematic shipments. A buyer must take action if test results do not comply with laws, contract requirements, or quality standards.

If the issue is regulatory, then the buyer acts in compliance with the customs procedures articulated above. If the issue is primarily contractual or stems from quality levels, then the buyer may demand a discount from the seller. Alternatively, the shipment can be refused and or redirected to a third party. Each of these scenarios is expensive and time consuming for both buyer and seller. The buyer may discover that he/she cannot fulfill promised orders downstream, or may face costly inventory problems. The seller faces the loss of value as well as additional time and transport costs. Even a single problem shipment, let alone multiple problem shipments, can lead to the loss of a customer. Questionable reliability creates business risk that neither side of the transaction can long tolerate.

An internationally recognized laboratory provides the basis for acceptance, and in many cases, is required to provide supporting evidence in disputes. A lab can also provide the justification that initiates shipment price modification discussions. The laboratory thus plays a critical role for independent verification and demonstration of the good's condition.

If testing is done prior to shipment, then a laboratory can provide all relevant parties with information regarding the quality level of goods at departure. The testing can verify, prior to shipment, that goods comply with contract specifications, and are free of phyto-sanitary concerns. Testing also serves as a type of "insurance" should a dispute arise after the receipt of goods, as the seller has documentation demonstrating the goods' compliance upon departure.

After receipt of goods, and after testing has been completed and results provided, the shipment is accepted. Depending on the contract, payment may be rendered at this point. In the case of pre-payment, or shipment against documents, the transaction is considered complete.

GEORGIAN LABS:

Currently, private labs in Georgia are not qualified and/or equipped in accordance with international standards. There is great variation between the capabilities and quality of these labs. They are of widely different caliber with various specialties, methods, equipment and facilities. Currently no lab operating in the area of food safety is internationally accredited and all need some degree of upgrade to attain such accreditation.

Thus, the quality and reliability of Georgian goods remains a serious concern in the international market place, as buyers are hesitant to consider Georgian products while the country lacks a local source for independent validation of these products. When problem shipments occur, the national reputation suffers as public records only list the place of origin while often a company name is not provided. Further, such incidents and/or other problematic experiences are frequently recounted by buyers, compounding the reputational issue, and often are used to justify, perpetuate and extract further discounts.

D. THE GEORGIAN DISCOUNT:

The Georgian market has overcome the perception of a lack of quality and safety validation primarily through discount pricing as processors agree to prices and/or terms highly favorable to the buyers. The number of these buyers is relatively small. The customer base for Georgian hazelnuts is limited to those traders with higher risk tolerances or brokers who control access to higher-level clientele. For some of these entrepreneurs, the payoff is the establishment of long-term relationships with a small cadre of Georgian processors and a discounted product.

However, as no accredited testing is performed prior to shipment, Georgian suppliers are exposed and under the constant threat of economic loss. Without independent verification or an ability to demonstrate that the products meet quality standards, such products often will not be considered for purchase by the more risk adverse, yet highly reliable, international trading houses. Currently, Georgian producers sell their hazelnuts but at a significant discount to the international market price.

CONTRACTS:

Please find below the three general types of contract and their different risk profiles.

Post-Payment Contracts: Buyers who wish to minimize their risk engage in “post-payment” or “COD + Testing” contracts. In these contracts, the buyer agrees to pay the seller only after receipt of the goods and an additional period in which testing is conducted to validate the quality and safety of the shipment.

Freight on Board Contracts: A second type of contract is where the buyer will issue payment against documents. The seller prepares the shipment and forwards the required paperwork to the buyer. The paperwork travels separately from the shipment and payment is made once the papers have been received. Whether the papers are received electronically or in physical form is dictated by the agreement. This type of arrangement is usually only established after demonstrated performance by the seller and after a trusting business relationship has been created. A “freight on board” (FOB) contract entails more risk than a COD + Testing contract, as the shipment could prove to be problematic. These contracts are still subject to post-shipment testing. However, the buyer in this case is in the position of requesting that funds be returned.

“Pre-Payment” Contracts: A third type of arrangement is where the buyer pre-pays the seller and is a “pre-payment” contract to obtain goods. These agreements have the greatest risk for buyers and tend to occur only after a protracted relationship and long demonstrated reliability.

As the risk profile increases for the buyer, the discount required from the seller also increases. Therefore, the highest price per kilogram for the seller is in the post-shipment case. However, the post shipment contract also has the longest cycle time for working capital. The shipment and testing can add as much as 7 to 25 days to the cash cycle time.

Currently, Georgian processors have limited lines of credit with the value of one shipment representing a large percentage of a credit line. For instance, the EPI consultant found that in one case, a single shipment represented nearly the entire line of credit for a processor. Therefore, a lack of available cash can become a limiting factor in production.

Further, the processors' critical capital is constantly at risk. Many processors told of situations where they had met their contract obligations, only to have the products rejected upon arrival at the final destination. When there is a problem, a processor's working capital and product must be recovered from abroad post shipment. Identifying problems prior to shipment and having a credible way to demonstrate and counter both quality and compliance challenges would ensure savings and limit the seller's risk.

III. METHODOLOGY

The EPI consultant used both qualitative and quantitative methods to assess the potential economic impact of developing a private internationally accredited laboratory.

QUALITATIVE METHODS:

Interviews with processors were conducted to identify areas of probable impact and to obtain estimates on various operational matters to support later analysis. The consultant explored the intersecting relationships and power dynamics among the actors in the hazelnut value chain. The processors interviewed represented slightly more than 80% of Georgia's exports. A limited number of buyers and farmers were also interviewed.

The EPI consultant sought descriptions of practices, behaviors and interactions resulting from the business activities parties engaged in during the course of business. The rich textural information of these discussions was distilled and the inability to verify and demonstrate quality as specified by a buyer was revealed as a major industry impediment.

During interviews, the Georgian hazelnut processors identified both the lack of quality verification and the inability to effectively demonstrate quality as detrimental to their business. Thus the EPI consultant considered the impact of providing independent quality verification by an internationally recognized, accredited private laboratory would have on the local industry. Specific impacts examined included: the effect on limited capital resources, post shipment loss prevention, and perpetual discounting.

QUANTITATIVE ANALYSIS:

Utilizing information provided during the interviews as well as statistical information and market data from GEOSTAT and FAO Stat, the EPI consultant built standard excel models to evaluate potential monetary impacts on both the hazelnut industry and the processors. Interview findings led to an exploration of impacts on cycle time, loss prevention and the impact of obtaining price parity.

The EPI consultant applied basic concepts from market analysis, logistics, probability and finance to evaluate the situation, analyze the data, and develop estimates for possible economic impacts of the laboratory, in order to monetize those potential impacts on the Georgian shelled hazelnut industry.

IV. FINDINGS

The interviews revealed a number of key themes that negatively impact the hazelnut industry. Among the key challenges, processors frequently cited the following:

- A lack of capital;
- Perpetual discounting, even post-shipment on already agreed contracts; and
- A need to access better and or more customers and buyers.

The processors clearly felt themselves to be in a weak market position. They perceive their current situation as one with limited resources and capability to obtain full market prices for their products, regardless of their quality.

The following report attempts to assess how an internationally accredited Georgian laboratory might address the processors' stated challenges and thus impact the value of Georgian shelled hazelnut exports. The analysis and findings will show how an internationally recognized laboratory will alleviate the concerns articulated by the players in the marketplace.

A. OVERCOMING CAPITAL LIMITATIONS

Processors frequently cited a lack of capital as a key challenge for their business. They were quick to point to limited lines of credit, high interest rates, and the bank's lack of consideration of the business's turnover as examples of the difficulties in accessing additional capital.

Having limited capital available would be a significant constraint on a processor's business. One shipment of hazelnuts is roughly 22 metric tonnes. The Georgian rule of thumb is that one must purchase around 60 tonnes of stock to produce one shipment. All stocks must be purchased for cash. Procuring adequate stocks for the operations is very cash intensive.

Examining the capital issue further, half of processors interviewed had the bulk of their contracts as either Pre-payment or FOB contracts to combat the limited availability of capital. Still, interviews revealed that most processors also engage in COD + Testing contracts. Under these contracts, funds are received after delivery and testing. Based on responses from processors, a COD + Testing contract adds anywhere from 7 to 25 days to the payment cycle. Table 4 below shows contract percentages by type, as described by the processors.

Table 4 - When Payment Is Received

Company	Prepay	FOB	COD+Testing
1	0%	20%	80%
2	20%	0%	80%
3	0%	0%	100%
4	70%	0%	30%
5	0%	80%	20%
6	100%	0%	0%
7	90%	0%	10%
8	0%	100%	0%
9	95%	0%	5%

10	0%	20%	80%
11	N/A	N/A	N/A
12	70%	30%	0%
13	0%	0%	100%
14	25%	0%	75%

During discussions with processors, the major reason cited for these COD + Testing terms was that buyers demanded verification of Georgian quality and contract compliance prior to releasing funds. Although 78% of the firms interviewed are conducting some type of testing, the international buyers remain highly skeptical of the results. In addition, several Georgian processors acknowledged that they received results from a Georgian lab that differed from those obtained from accredited foreign labs. Many buyers, and even several Georgian processors, consider the existing Georgian test results to be inadequate for verification purposes. The testing and methods used by Georgian labs are not accredited to international standards, and thus not recognized outside of Georgia.

The limited discussions with buyers confirmed the processors statements. The three international buyers interviewed all expressed interest in the development of an internationally accredited Georgian laboratory. Two even supplied letters of support (see section V. Letters of Support). The buyers viewed a lab as an important step towards quality verification. Further, ensuring that quality levels were being met at shipment reduced the risk to both parties. One buyer even volunteered that if such a laboratory were to exist, and was proven to be reliable, they would be willing to change their payment terms to FOB, but would require a discount for doing so.

The discussions with both Georgian processors and the limited number of international buyers, revealed that an internationally accredited private laboratory in Georgia, capable of conducting the specified quality and food safety tests would provide sufficient verification and demonstration of product quality to entice some buyers to alter the payment terms. The better terms would significantly reduce the cash cycle time and increase processor liquidity.

CASH AVAILABILITY LIMITS PRODUCTION

Interviews also revealed that the extended cycle time and lack of working capital did indeed impact the procurement of stocks and limit production. Interviews revealed the following:

- Lines of credit for processors were limited and expensive, making the speed at which additional cash becomes available to buy stock quite important.
- Processors discussed an inability to purchase enough stock, particularly when pricing is favorable; quick access to financing would allow them to process more shipments.
- Farmers revealed that often the processors do not have cash available for immediate payment. When asked for an explanation, farmers volunteered that in such cases, the processors were waiting for cash from a recent shipment.

The processors are often cash poor and unable to buy additional stocks while they await payment from COD + Testing shipments. Therefore, utilizing an internationally accredited lab would enable processors to obtain better contract terms, facilitating faster access to finance, and easing constraints on production.

EXCESS CAPACITY EXISTS

Before evaluating the potential impact of such a change, the consultant verified that the capacity exists to absorb the potential volume expansion which shortening the cash cycle would stimulate.

Although each plant's maximum capacity was not divulged, combining interviews, direct facility observation, and examining average cycle times, processors appear to have the necessary excess capacity. In addition, some firms indicated that they can, and do, supplement capacity by subcontracting with small independent processors.

To determine the frequency of shipments, the consultant divided the processing season length by the number of shipments. The time period used was nine months, or 270 days, based on input from the processors. The calculation provided varying results showing an average frequency in the range of 2.7 days per shipment to 270 days per shipment. The "frequency" was then compared to the minimum number of days needed to prepare a shipment. The important point from the calculation is that the processing time does not appear to be the bottleneck. The results are shown below in Table 5, entitled Current Market Situation (From Interviews).

Table 5 - The Current Market Situation (From Interviews)

Company	Tonnes	Market %	Shipments	Frequency (Days)	Minimum Days/Shipment
1	462	2%	21	12.86	7.00
2	440	2%	20	13.50	N/A
3	22	0%	1	270.00	N/A
4	2,200	12%	100	2.70	N/A
5	760	4%	35	7.82	5.00
6	1,144	6%	52	5.19	N/A
7	2,640	14%	120	2.25	N/A
8	1,100	6%	50	5.40	N/A
9	1,100	6%	50	5.40	N/A
10	2,200	12%	100	2.70	1.50
11	44	0%	2	135.00	N/A
12	1,188	6%	54	5.00	5.00
13	1,000	5%	45	5.94	3.00
14	1,100	6%	50	5.40	4.00
Total Interviewed:	15,400	81%	700	0.39	
Market:	19,093	100%	868	0.31	

*3 companies sighted using subcontractors to increase throughput

N/A - Data not provided

In order to validate these results, the consultant performed the same exercise based on an even shorter eight-month season. The results, although closer to stated minimum time requirements for processing and preparing a shipment, still did not exceed the time needed.

The consultant concludes that if current payment terms could be improved, excess capacity does appear to exist to allow for the processing of additional quantities.

TONNES ELIGIBLE FOR BETTER PAYMENT TERMS

Existing export tonnage was reviewed in order to quantify the impact a potential laboratory might have on the hazelnut industry. The tonnes exported by each firm were compared with the stated percentage of COD + Testing contracts (see Table 4 above for the percentages). The comparison provided an estimate of the number of tonnes exported eligible for an "upgrade" from COD + Testing to FOB terms. In addition, as the processors interviewed represented only 81% of the total market, the "Projected Total" tonnage available (see Table 6 below) reflects the total estimates from the firms interviewed. The consultant increased these estimates by 19% to account for the entire market. The results indicate that approximately 35% of the exports, or 6,769 tonnes, are eligible for better terms.

Since not all buyers will upgrade, and since some buyers will require such steep discounts that upgrading will not be economically feasible, conservative scenarios were developed to estimate the probable impact of up-grades. A 10% conversion scenario, a 15% conversion scenario and a 20% conversion scenario were selected. The expected tonnage for upgrades in each case is detailed below in Table 6.

Table 6 - Tonnage Eligible for Better Payment Terms: 3 Cases

Company	Eligible	10%	15%	20%
1	370	37	55	74
2	352	35	53	70
3	22	2	3	4
4	660	66	99	132
5	152	15	23	30
6	-	-	-	-
7	264	26	40	53
8	-	-	-	-
9	55	6	8	11
10	1,760	176	264	352
11	N/A	N/A	N/A	N/A
12	-	-	-	-
13	1,000	100	150	200
14	825	83	124	165
From Interviews	5,460	546	819	1,092
Projected Total	**6,769**	**677**	**1,015**	**1,354**

The tonnage estimates developed in each of the three cases were used to conduct a basic cycle time analysis. The consultant assessed the impact on the company to determine if the "upgrade" would be profitable.

EXAMPLE: THE 10% CONVERSION RATE CASE

All three conversion scenarios were modeled, but only the 10% case will be described in detail below, as the only difference was the assumption regarding the percentage of contract volume that would be converted from COD + Testing, to FOB. Please find below a description of other key assumptions used in the model.

Key Model Data Assumptions:

- The price per kilogram was taken from the average value per tonne of Georgian exports in 2011 as reported by GEOSTAT.
- In order to be conservative, the consultant used an 11% interest rate, as it was the lowest interest rate cited during the interviews. Higher rates would result in greater savings on interest costs and rates as high as 17% were cited.
- The days required to fill an order are based on inputs from processors. The time includes procurement, drying, processing, and preparing a shipment.
- The profit per kilogram is based on data provided by the processors.
- Length of time in transit was estimated conservatively at an average of 10 days. Processors reported length of transit as ranging from 7 to 25 days, with additional time for testing. When averaged, the various estimates are approximately 13 days plus the testing time. The longer the transit time, the greater the potential to reduce cycle times. Again, an effort is being made to be conservative.
- The upgrade discount represents the maximum discount a processor would be willing to provide given the other assumptions. In this model, with the assumptions above, the figure was USD 0.12 per kilogram.

When the assumptions are put into the cycle time model, one realizes that the value per shipment decreases. The decrease stems from the discount required to alter the payment terms from COD + Testing to FOB. However, because the payment is received much more quickly, the cash can be redeployed to purchase additional stocks. The expected result is an increase in a processor's number of production cycles.

By shortening the payment cycle, a processor has access to financing much sooner, and the constraint for procuring stocks is removed. The expected result is an overall increase in production and an increase in the number of shipments. The added turnover thus represents an increase in the total value of the market, as well as increased profitability for a processor. A processor has the opportunity for higher productivity levels and greater turnover.

The following Table 7, entitled Impact: Assuming 10% Case, details the results from the lowest conversion rate case demonstrating the value to Company 1 of shortening the payment period. The same process was also conducted for the 15% and the 20% cases.

Table 7- Impact: Assuming 10% Case

Company 1: 10% Conversion Rate		
Value per Shipment	**Current**	**Upgraded**
Tonnes Upgraded	37	37
Shipments Upgraded	1.68	1.68
Price/Kg	**6.47**	**6.35**
Upgrade Discount ($)		0.12
Price/Tonne	6,470	6,350
Tonnes/Shipment	22	22
Interest Rate	11%	11%
Interest/Day	0.030%	0.030%
Days to fill order	11	11
Days in Shipment	10	0

Value of Shipment	142,340	139,700
Interest Savings	-	429
Total Value/Shipment	**142,340**	**140,129**
Cycle Time - A Critical Element		
Profit From Extra Cycles	**Current**	**Upgraded**
Cash cycle (days)	21.00	11.00
Profit/per kg.	0.23	0.11
Profit/Tonne	227	126
Profit/Shipment	4,994	2,783
Possible turns	1.68	3.21
Tonnage Turned	36.96	70.56
Revenue Turned	239,131	449,432
Profit	**8,390**	**8,926**

CYCLE TIME IMPACT ON PRODUCTIVITY

The next question is whether enough capacity exists to absorb the required additional processing. Looking at Table 8, which calculates the impact of the upgraded tonnage on cycle time, one can see sufficient capacity does exist for those five companies that reported their minimum days/shipment. Further, from comments and inputs from interviewees, from direct observation of facilities, and the very low degree of frequency change, the consultant is highly confident that adequate capacity exists to absorb the additional turnover.

Table 8- The Impact of Upgraded Tonnes on Shipment Frequency

Company	2011	10% Upgrade	15% Upgrade	20% Upgrade	Minimum Days/Shipment
1	12.86	12.34	12.10	11.86	7.00
2	13.50	12.96	12.70	12.46	N/A
3	270.00	256.56	250.33	244.40	N/A
4	2.70	2.66	2.64	2.62	N/A
5	7.82	7.73	7.69	7.66	5.00
6	5.19	5.19	5.19	5.19	N/A
7	2.25	2.24	2.23	2.23	N/A
8	5.40	5.40	5.40	5.40	N/A
9	5.40	5.39	5.38	5.37	N/A
10	2.70	2.59	2.54	2.49	1.50
11	135.00	N/A	N/A	N/A	N/A
12	5.00	5.00	5.00	5.00	5.00
13	5.94	5.64	5.51	5.38	3.00
14	5.40	5.20	5.10	5.01	4.00
Total Interviewed:	0.39	0.38	0.38	0.37	
Market:	0.31	0.31	0.30	0.30	

*3 companies sighted using subcontractors to increase throughput
N/A - Data not provided

Given that there is an adequate incentive to produce, and capacity exists to absorb the production increase, developing an internationally accredited laboratory will have a positive impact on both productivity and exports. In the next section, the impact on the entire industry will be assessed.

CYCLE TIME IMPACTS

Looking at the entire industry, the impact of shifting between 10% and 20% of the available tonnage to FOB terms increases industry's productivity by between 3% and 6% and the processed material by between 600 and 1,200 tonnes. The expected economic impact on the industry exports, on an annual basis, is anticipated to be between USD 3.8 and USD 7.6 million per year. If considered in perpetuity, and using the stated 13% loan rate of the Bank of Georgia (BoG), the figure represents an industry impact ranging between roughly USD 29 to USD 59 million. The full results are detailed below in Table 9.

Table 9- Improved Cycle Time Impacts Tonnage			
Scenario	10%	15%	20%
Tonnes in 2011	19,093	19,093	19,093
Tonnes from extra cycles	615	923	1,231
Total Tonnage:	19,708	20,016	20,324
% Increase on Tonnage	3.22%	4.83%	6.45%

Improved Cycle Time Impacts Value ($'000):			
Scenario	10%	15%	20%
Value/kg for 2011	6.47	6.47	6.47
Discount/kg to Upgrade	0.12	0.12	0.12
Export Value for 2011	123,471	123,471	123,471
(Less) Pre-Upgrade Value	4,377	6,566	8,755
(Plus) Post Upgrade Value	4,296	6,444	8,592
(Plus) Value of Extra Tonnes	3,906	5,858	7,811
Net Increase in Value	3,824	5,736	7,649
Total Value of Exports	$127,295	$129,208	$131,120
% Increase in Value	3.10%	4.65%	6.19%

Calculated as an Impact in Perpetuity ($'000):			
Additional Value	$3,824	$5,736	$7,649
Annual Local Interest Rate	0.13	0.13	0.13
Total Value:	$29,418	$44,126	$58,835

B. POST-SHIPMENT LOSS PREVENTION

Processors indicated that a direct benefit of an internationally accredited lab would be that the processors would have the ability to push back against claims of inferior quality through having recognized testing results. Further, the 21% of processors not testing would also be incentivized to use the testing services to protect against losses, leading to an overall improvement in the quality of goods shipped. For this second line of inquiry, the anticipation is that the use of the internationally accredited laboratory will lead to a number of outcomes, which would positively impact processors.

Post shipment "cheating" was cited as a problem facing the processor. Since the processor has no internationally recognized test results, he remains vulnerable to disputes. The processor has no recognized source of verification that the goods were in compliance prior to receipt and testing by the buyer. Buyers are known to take advantage of these

circumstances and may make claims after receiving a shipment that the quality is not up to the contract requirement and or specifications. The Georgian processor is in a position of having to provide a discount, and/or take other expensive steps, such as cleaning the shipment for re-inspection, replacing the shipment, and other such remedies. In the case of shipments under COD + Testing terms, the processor can also look forward to additional delays in the return of cash.

With prior testing through a local internationally accredited laboratory, a problem shipment could be avoided. The seller would know definitively whether quality standards were met prior to shipment. Thus problem shipments could be discovered prior to leaving the factory, before they become a problem and damage both the company's reputation and the Georgian industry's reputation.

An additional benefit is that a number of the claims citing poor quality may not materialize once the Georgian processor is known to have internationally recognized documentation. Internationally recognized, independent verification and demonstration of quality will discourage the lodging of false claims.

The other area of benefit will arise when claims are made. The Georgian processor will have a better opportunity to refute the claims and have them either dismissed or reduced.

All of these scenarios can result in the reduction of problem shipments and losses. The impact will be to strengthen both the company's and the Georgian industry's reputation.

ESTIMATE OF LOSSES

To quantify the impact an internationally accredited laboratory would have on industry losses, the current cost of those losses must be quantified. Processors spoke about such costs and their frequency. From these discussions they were estimated to be approximately USD 215,205 per year. As indicated in the Table 10 below, the impact is less than 0.2%.

Table 10 - Industry Estimate of Losses/Kg.

Loss/Kg	0.0113
Loss/Tonne	11.27
Loss/Shipment	248
Tonnes Exported	19,093
Value of Exports	123,471,000
Estimated Losses	215,205
Max Value	$123,686,205
% of Value Added	0.17%

IMPACT ON PROCESSORS

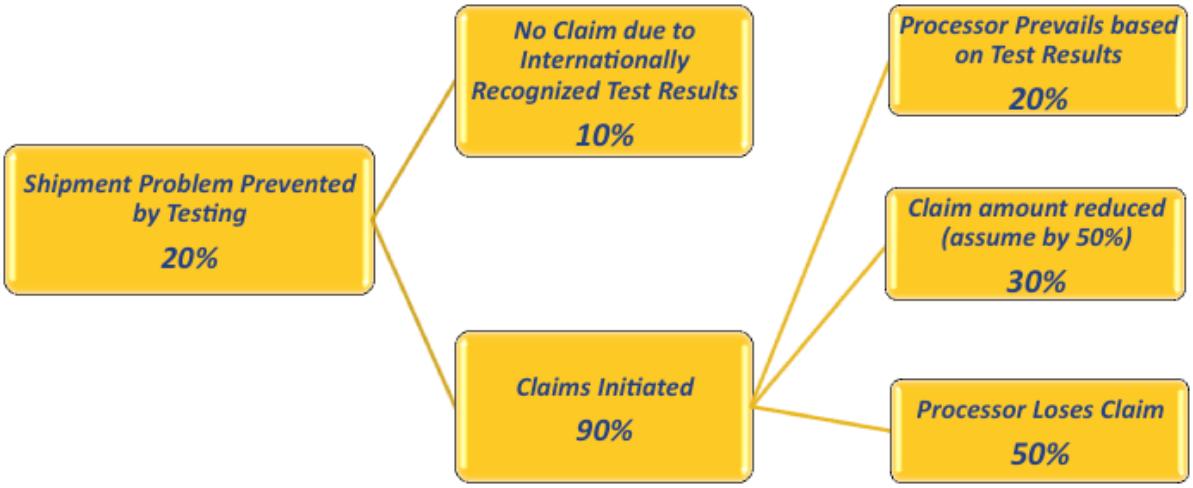
Given that the industry value is in excess of USD 123 million, one may wonder why USD 215,000 is of importance, and worth investigating. Upon closer inspection, the consultant found that though addressing these losses only adds about 0.2% of value to the industry, for the processors, the impact is far greater. When viewed in the context of profitability, the impact is much more significant. Assuming that a processor earns approximately USD 0.23 per kilogram in profit, or nearly USD 5,000 per shipment, the average annualized loss of $248 per shipment represents a loss in profitability of nearly 5%. See Table 11 for details.

Table 11- Impact on Profit per Shipment	
Profit/Kg.	0.23
Profit/Tonne	227
Profit/Shipment	4,994
Loss/Shipment	248
Net Profit/Shipment	$4,746
% of Profit Lost	4.97%

PROBABILITY OF IMPACT

A private internationally recognized laboratory provides the possibility to reduce these losses, as pre-testing of shipments can avoid problems. With the recognized results, some buyers may choose not to bargain post-shipment. When claims are brought, the processor may be able to have them dismissed or reduced. All of these are positive impacts stemming from the availability of recognized international testing.

Applying probability theory, the impacts can be quantified. Assumptions were made regarding the likelihood of each case, and a decision tree was created to determine the overall probability of a positive outcome. See the decision tree below for more information.



The consultant used these probabilities and calculated that based on the current average shipment loss of USD 248, a processor may be able to prevent around USD 132 of loss per shipment, by having internationally accredited testing conducted on the product prior to export. Please see Table 12 below for more information.

Table 12 – Impacts and Probabilities			
Positive Impacts	**Probability**	**Effective Probability**	**Saving/Shipment**
Problem Prevention	20%	20.00%	$50
Claim Avoidance	10%	8.00%	$20
Prevail in claim	20%	14.40%	$36
Compromise (Value=50%)	30%	21.60%	$27
Total Impact		64.00%	$132
Average Loss/Shipment:	$248		

IMPACT ON MARKET

The expectation is that the annual impact of the internationally accredited laboratory would be approximately USD 114,000. Albeit the figure is very small in terms of the industry, for the processors this would mean a 2.6% increase in profitability over the current situation. Please see Table 13 below for more information.

Table 13 - Impact on Market	
Savings/Shipment	132
Savings/Tonne	6
Total Tonnes (2011)	19,093
Annual Market Impact	$114,489

This impact has multiple benefits. The reduction in problem shipments alone would lead to improved international reputation, helping to lower the perceived risk of buying from Georgian processors. Further, reducing post-shipment losses is a first step in the march towards price parity, which will be discussed in the next section. The perpetual discounting situation would begin to ease. As the level of risk is perceived to decrease, more buyers will become willing to take that risk, and Georgian sellers will be able to access a broader range of customers. These benefits are hard to measure, but they all begin with the above measurable analysis.

VALUE IN PERPETUITY

As in the cycle time case, the annual impact was calculated as a perpetuity using the published BoG interest rate of 13%. As is shown below in Table 14, the perpetual impact on the industry is approximately USD 880,000.

Table 14- Impact In Perpetuity	
Additional Value	$114,489
Annual Local Interest Rate	13%
Total Value	$880,687

C: PRICE PARITY: OVERCOMING DISCOUNTING

Processor interviews frequently referenced the need for better quality customers and customers that did not force processors to accept a discount. Some of the processors believed that if they could just reach the end market, then all would be well.

However, as described earlier, the end-market requires validation and demonstration of the quality of the Georgian product. The buyers willing and equipped to take the perceived risk are the ones attracted to the Georgian market, and they demand a hefty discount for taking the risk. To reduce and eliminate the risk will take a number of years.

Until Georgian processors can consistently demonstrate reliable high-level quality in compliance with company requirements and food safety standards, they will not attain price parity. This process will take several years, and occur gradually.

The final product is capable of achieving price parity, certainly at the Class I level. Buyers spoken with indicated that they had experience with high quality product from Georgia. One indicated that though the Georgian processors do not use state of the art equipment and methods, they can produce a very high quality Class I product. However, the supporting infrastructure ensuring and verifying consistent top quality production is not yet in place.

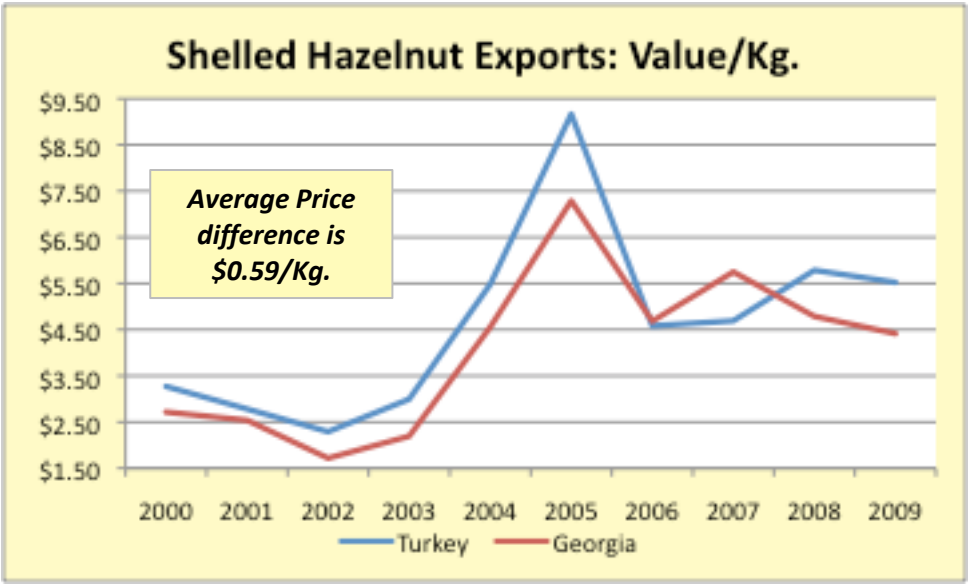
An internationally accredited laboratory would be a catalyst spurring the drive towards attaining price parity. The development of such a laboratory would signal Georgia's commitment to quality and the maturation of supporting infrastructure. In addition, those processors not currently producing top quality would have the ability to understand where they fall short and address those problems. The result would be a gradual spiraling upward of overall quality levels.

Concurrently, the ability to verify and demonstrate product quality relatively easily will attract more buyers to the Georgian products. As quality improves and is shown to be consistently of high level, then demand should increase. In addition, upon being able to consistently demonstrate quality levels in an internationally recognized manner, Georgian processors would be capable of demanding higher prices. Following general economic theory, price will, over several years, rise towards parity with the world market.

WHAT IS THE GEORGIAN DISOUNT?

Asking processors to state the discount demanded for Georgian hazelnuts elicits a range of answers. The bulk of those answers cluster between USD 0.20 and USD 0.40 cents per kilogram. However, analysis of FAO Stat data tells a different story. Table 15 below, details the differential from 2000 through 2009 (the most recent year for which such comparable data was provided). The data suggest that Georgian shelled hazelnuts trade on average about USD 0.59 below the market setting Turkish price.

Table 15



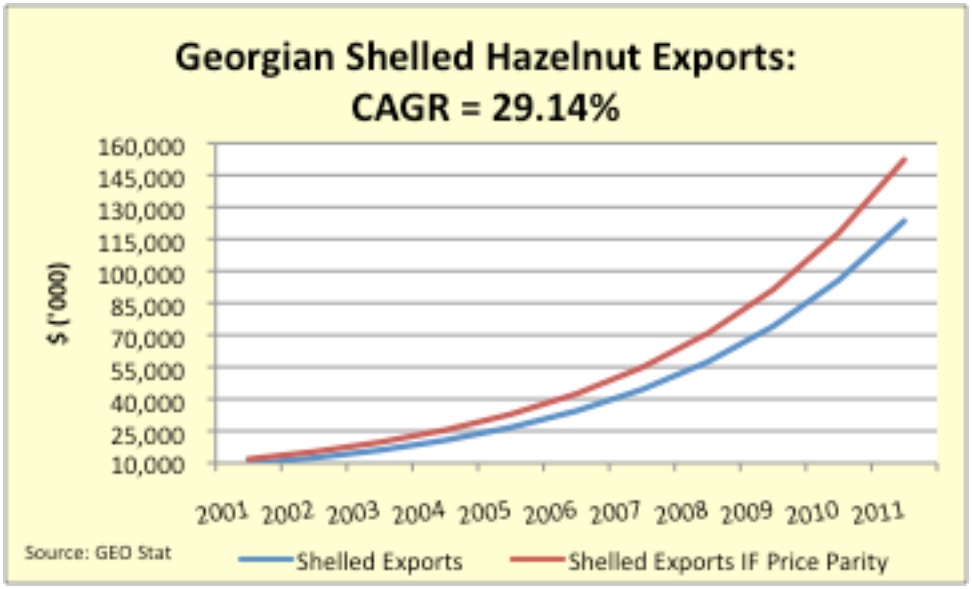
THE COST OF THE "GEORGIAN DISCOUNT"

To observe the impact of the discount on the hazelnut market to date the compound annual growth rate (CAGR) was determined. Then, the curve was recalculated assuming price parity. Both were graphed to illustrate the differential (see Table 16 below).

In evaluating Georgian exports over the past 10-year period, the market has grown in value from USD 9.5 million in 2001 to USD 123 million in 2011. The CAGR is therefore approximately 29.14%. Using the FAO Stat data described above, reveals an average price differential of USD 0.59 between 2000 and 2009.

Overlaying the price parity curve, one would have expected the Georgian market to go from USD 11.8 million to USD 152.2 million. Therefore, in 2011, the Georgian discount resulted in roughly USD 28.7 million in lost value to Georgian shelled hazelnut exports. Hypothetically, assuming Georgian products were at price parity, the value of the Georgian market would be 23% greater than today. Please see Table 16 below for more information.

Table 16



POTENTIAL IMPACT

During interviews, the processors and the limited number of buyers agreed that an internationally accredited laboratory would be a catalyst for improving quality levels of the entire Georgian market, as well as demonstrating that quality to the broader international market. Processors would have reliable testing results allowing them to make improvements. In addition, they would be able to weed out problem shipments before they were received abroad, improving their profitability as well as the Georgian industry's reputation. Finally, the quality testing would demonstrate to the broader market, that in fact, Georgian products were of a certain caliber.

Looking forward, an effort was made to project what the gradual impact of attaining price parity would look like for the industry. To accomplish this, the compound annual growth rate for the past ten years, as well as the past five years was calculated. Since the most recent five years indicate a sustained growth rate lower than the full ten, the lower rate was used to forecast the next ten years. The purpose is not to provide a definitive forecast, but instead to illustrate over a ten-year period, how the rise toward price parity affects the market.

The five-year compound annual growth rate was determined to be roughly 18%. Taking the range of estimates of current discounting, alternative value curves were calculated on the potential growth rate. The curves were calculated based on the CAGR and gradual price rises until parity is achieved. As this is simply an attempt to illustrate the effect, a 10-year period was used. The chart below shows how the export value curve of Georgian hazelnut exports would shift upwards as prices gradually rise to achieve price parity.

At the current growth rate, by 2021 the expected market would range between USD 645 million to USD 700 million if movement towards price parity can be achieved. Please see Table 17, entitled Impact of Gradual Rise to Price Parity, for an illustration

Table 17

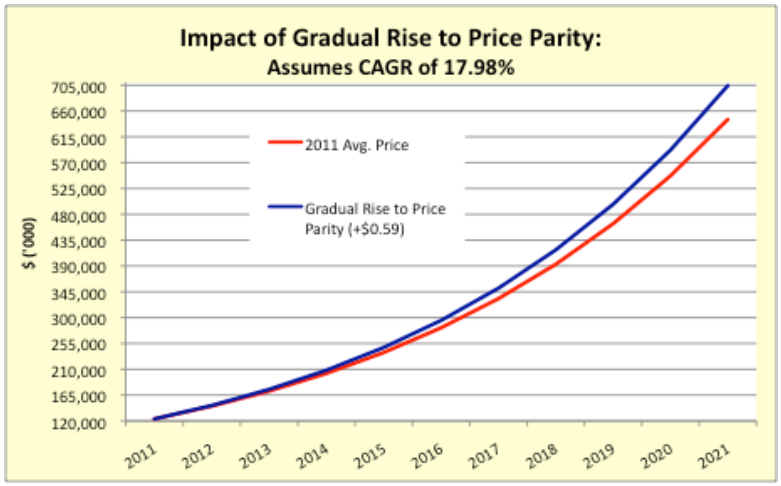


Table 17 demonstrates that the impact of discounting, even when considered as gradually rising towards quality parity, is a significant drag on the overall value of Georgian exports. The expectation is that the laboratory will be a critical first step towards eliminating the "Georgian Discount." As detailed in the loss prevention section, the lab will begin to impact price parity in the short term. In the longer term, through continued efforts, bolstered by testing verification and the delivery of high quality products, prices should gradually rise.

THE COST OF DISCOUNTING

In order to calculate the broad range of economic impacts a laboratory will have on the value of the Georgian export market, the estimated price differential must be known. Table 18 below estimates the values given different estimates provided by processors as well as the data from FAO Stat. By looking at Table 18, one can see the impact of discounting for 2011 is estimated at between USD 3.8 million and USD 11.3 million. This is the amount of value lost to the Georgian market through discounting. Developing an internationally accredited lab can assist in delivering this additional value to the Georgian shelled hazelnut market. The lab will be the catalyst that drives the changes required to gradually attain price parity. If such a lab existed, and price parity was attained, the difference in annual values, based on 2011 is shown below in Table 18.

Table 18 - Cost of Discounting to Georgian Shelled Exports			
Estimated Case	***Low***	***Medium***	***High***

2011 Tonnage	19,093	19,093	19,093
2011 Shelled Value	123,471,202	123,471,202	123,471,202
Average Price/kilo	$6.47	$6.47	$6.47
Estimated Discount per kg.	$0.20	$0.40	$0.59
Cost of Discounting	***$3,818,600***	***$7,637,200***	***$11,264,870***

As the laboratory gradually impacts the market, leading to quality improvements, and further verifies and demonstrates that quality to the international buyers, the pricing differential will gradually decrease. The risk profile of Georgia will continue to drop, additional buyers will vie for product, and the price of Georgian shelled hazelnuts will rise until Georgian shelled hazelnuts can demand the same price as the market leader Turkey.

D. TOTAL IMPACT

The main concerns effecting the Georgian shelled hazelnut market were identified by the processors. Capital availability, perpetual discounting, and access to better, and/or more customers/buyers, were all cited as factors limiting the growth and value of the market.

Digging below the surface on these issues, the need for verification and demonstration of quality is revealed as a critical factor in each of these areas. Without verification and demonstration of quality, recognized by the international markets, the flows of capital take longer, the opportunity to push back on discount demands is minimal, and the number of buyers willing to take on the perceived risks in the market will remain small.

A private internationally accredited laboratory will provide certainty of quality. Such a lab will provide independent verification and demonstration of quality. This in turn will allow contract terms to be more favorable, easing cash constraints. The verification and demonstration of quality will also lead to fewer problem shipments, enhancing national credibility, and improving processor profitability. In addition the laboratory will serve as a catalyst for consistent quality improvement and ultimately lead the Georgian shelled hazelnut market towards price parity. Thus the lab will provide a key mechanism for reducing the perceived risk profile of Georgian hazelnuts.

In order to evaluate the long-term comprehensive value and sustainability of these impacts, they must be analyzed together.

ANNUAL IMPACT

First, consider the annual cost of price parity. The annual impact on the Georgian market was articulated to be somewhere between USD 0.20 and USD 0.59 cents per kilogram. Calculating the revenue lost for discounting in 2011 shows anywhere from USD 3.8 to USD 11.3 million. That is the annual cost of discounting. Having an internationally accredited laboratory capable of verifying and demonstrating quality would serve as the catalyst for the gradual erosion of these discounts, leading ultimately to price parity.

Next, consider the impact of loss prevention. The figure was identified primarily for its importance to profitability as well as being the first step toward price parity. When totaling the value, this amount must be subtracted from the price parity figure, as the reduction of losses is imbedded in the discounting figures. Subtract the annualized impact of USD 114,489.

Finally, the cycle time analysis must be added. By reducing the time cash is unavailable due to payment terms, productivity increases and more production becomes possible. Turnover will increase, leading to an additional USD 3.8 million to USD 7.6 million in industry revenue.

The result of the calculations, given the different assumptions, is shown below in Table 19 and three cases are provided with low, medium, and high assumptions.

TABLE 19 - ANNUALIZED IMPACT ON GEORGIAN EXPORT VALUES			
Estimated Case	***Low***	***Medium***	***High***
Value added by Price Parity	3,818,600	7,637,200	11,264,870
Minus Loss Prevention	114,489	114,489	114,489
Plus Cycle Time Increase	3,826,241	5,736,436	7,648,582
Total Added Export Value:	***$7,530,352***	***$13,259,147***	***$18,798,962***

IN PERPETUITY

Looking at the annualized impacts as perpetual impacts is an interesting exercise. The assumption is that once established, an internationally accredited laboratory fundamentally changes the market. The resultant market impacts can then be considered to occur in perpetuity. Given the current BoG interest rate of 13%, the permanent effect of the changes is between USD 57.9 million and USD 144.6 million. See Table 20 below for more details.

Table 20- Value in Perpetuity of Impacts on Georgian Exports			
Estimated Case	***Low***	***Medium***	***High***
Total Annual Impact	7,530,352	13,259,147	18,798,962
Bank of GE Rate	13%	13%	13%
Value in Perpetuity	***$57,925,782***	***$101,993,438***	***$144,607,402***

E. RECOMMENDATIONS

An internationally accredited Georgian laboratory is an essential building block for international trade and food safety compliance, as it will allow Georgia to establish reliability as a producer of quality hazelnuts. Therefore, the consultant strongly recommends the following:

A. EPI's BEE and AG Components should work together with the laboratory to ensure maximum benefit for all stakeholders and value chains. This will facilitate communication between the local laboratory and the EPI Components to ensure that the most pertinent and financially viable set of tests and methods are adopted.

B. The findings from the collaboration between EPI and the local laboratory should be incorporated into the accreditation process. This will ensure the laboratory's financial viability as well as lead to the provision of much needed reliable services throughout the agricultural industry.

C. EPI work with the identified local laboratory to assist in attaining international accreditation. The laboratory's internationally accredited testing capability should be rooted in the needs of the Georgian hazelnut sector, and accreditation should be achieved as soon as practically possible.

If considered prudent and possible, these recommendations should be implemented and in place prior to September 2012 in order to support the upcoming hazelnut season.

V.LETTERS OF SUPPORT

May include contact lists, presentations delivered, budgets, additional tables, etc.

DAARNHOUWER & CO. BV

Thomas C. Beck
Cold Brook Ventures, LLC
29 Bear Hill Road
North Andover, MA 01845
U.S.A.

Zaandam NL, 18th April 2012

Dear Mr. Beck,

re: laboratory initiative in Georgia

thank you very much for visiting us the other day and explaining the initiative to develop and internationally accredited laboratory in Georgia.

This initiative looks very promising for the future of the hazelnut industry in the country by enabling the processors/shippers to produce analysis certificates that are requested by the hazelnut users in the European Union.

We think that at the end this set up will not just benefit the hazelnut industry but the whole agricultural (export) industry from Georgia.

We wish you a lot of success with your further efforts.

Yours faithfully,

Cees P.A. Weel

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Attention Thomas BECK

Dear Sir,

It has been a pleasure meeting you in Tbilisi ; having the chance to share our projects and investments in the country with someone that is looking in the same direction is always motivating.

As you know Georgia has been developing smoothly the export of hazelnuts into E.U. market. CAP organization has been and will be a part of this success; nevertheless, today the volumes that are landing in this market became seriously significant and the final buyers (Industry) are now looking to higher standards (food safety, best practice, certification of factories, analyses...) in order to match international ones (lead by Turkey of course).

That makes a serious challenge for all Georgia.

We, as CAP industries (AER Company-Senaqi) are pushing hard to get the Georgian Union of Exporters picking up in order that the country would be officially represented at Brussels' Commission, but as you know, the Union by itself doesn't bring anything unless the whole industry has targeted something precise to communicate on. At this point we are thinking about two things :

- To show Brussels that a lot of factories have achieved or planned to be HACCP & IFS certified.
- To have in Georgia, at least one certified & internationally recognized laboratory that would be able to supply with Aflatoxin HPLC, Heavy Metal, Pesticides residues, Mould, Yeast, Salmonella and all the major biological analyses.

I would like to insist, particularly on this second issue (lab.) as providing such analyses through a RECOGNIZED & CERTIFIED PRIVATE LABORATORY is mandatory to get Georgia considered as a trustable origin for hazelnuts.

Any help on this matter would be extremely appreciated and all the exporters would be very happy to have such a tool to promote their production, by having and providing more security as fare as food safety is concerned

Yours faithfully

Bruno GIROUD

CIO

VI. STANDARDS (TS 3075)

TURKISH STANDARDIZATION INSTITUTION
HAZELNUT KERNELS STANDARD
TS 3075

(November 2002)

0. Subject, Definition, Content

0.1. Subject

This standard is about definition, classification, specifications, sampling, evaluation, analysis and presentation to the market of hazelnut kernels.

0.2. Definitions

0.2.1. Kernel
Hazelnut kernels of nuts free from shells of cultivated plants of *Corylus avellana* L. and *Corylus maxima* Mill., and their hybrids.

0.2.1.1. Rounded kernel
Hazelnut kernels of which diameter is equal to or shorter than the length and round in shape.

0.2.1.2. Pointed kernel
Hazelnut kernels of which length is longer than the diameter and nut apex is pointed.

0.2.1.3. Other kernels
Hazelnut kernels other than rounded and pointed nuts.

0.2.1.4. Clean kernels
Hazelnut kernels which are free from visually detectable adhering dirt and any other foreign matter

0.2.1.5. Foreign matter
Any matter except whole kernel or kernel pieces hazelnut kernels.

0.2.1.6. Insect damaged hazelnut
Visually detectable damages on hazelnut kernels caused by insects and other animal parasites and presence of dead insects or insect remains.

0.2.1.7. Moldy hazelnut
Hazelnut kernels containing visible mould filaments by naked eye.

0.2.1.8. Pieces
Hazelnut kernels of which more than 1/3 of its size is missing and pieces which do not pass through round holed screen of 5mm diameter.

0.2.1.9. Rancidity
Formation of undesirable taste on hazelnut kernels due to oxidation of fat or free fatty acids.

0.2.1.10. Rotten
Hazelnut kernels of which chemical structure is significantly decomposed by action of microorganisms.

0.2.1.11. Shriveled hazelnut
The wrinkling of more than 50% of the skin surface of the hazelnut kernel which usually occurs in high cropping years, in seasons effected by drought stress or poor nutrition, and as an inherited trait.

0.2.1.12. Shrunken hazelnut
Formation of undeveloped hardy kernel due to excessive air temperature during rapid kernel growth after fertilization.

0.2.1.13. Stains and physiological changes
Alterations in color and taste of hazelnut kernels during drying or storage in undesirable conditions due to excessive heat (color changes in kernel cavity to brown or dark brown because of slight separation of cotyledons do not affect the taste and the smell of kernels, and these are not considered as defective kernels).

0.2.1.14. Twins
Development of two kernels in one nut.

0.2.1.15. Yellowing
Formation of dark yellow color at cut surfaces of kernels accompanied by softening or not softening and/or slight alterations in smell and taste.

0.2.1.16. Tumors
Formation of tumor (hard tissue) to cover the insect[1] damage and white and hard tissue formation with in the kernel meat due to insect damage (hard tissue smaller than 2 mm is not considered).

0.2.1.17. Invisible rot
Development of mould with in the kernel not detected from outside.

[1] *"Palomena prasina L."*

0.2.1.18. Invisible mold
Development of mold in kernel cavity not detected from outside.

0.2.1.19. Sour taste
Deteriorated kernels for taste color and smell which give slightly sour taste when eaten due to oxidation of fats.

0.2.1.20. Mechanically damaged
Formation of damages larger than 3 mm in diameter and deeper than 1.5 mm on kernels during shelling.

0.2.1.21. Pressed
Change in shape of kernel due to physical pressure and other reasons.

0.2.1.22. Crop year
The year hazelnuts are harvested.

0.3. Content
This standard contains sound and intact hazelnut kernels defined in titles 0.2.1, 0.2.1.1, 0.2.1.2 and 0.2.1.3., and defective kernels defined in titles 0.2.1.6 and 0.2.1.21.

1. Classification and Characteristics

1.1. Classification
Hazelnut kernels are grouped based on their shape and commercial definitions, are sized based on dimensions and are classified based on its characters.

1.1.1. Groups
Kernels are divided into three groups based on shape and commercial definitions;
- Rounded kernels (Tombul, Palaz, Mincane, Çakıldak, Delisava, Foşa, Kalınkara, Kan and Cavcava, etc.)
- Pointed kernels (Sivri, İncekara and Kuş)
- Other kernels (Badem, Ordu İkizi, Kargalak)

1.1.2. Sizes
Kernels are divided into two sizes based on their largeness;
- 9mm and over (Obligatory for Extra and Class I, optional for Class II),
- 6mm-<9mm (Piccolo, small)

1.1.3. Classes
Kernels are divided into three classes based on quality characteristics;
- Extra,
- Class I,
- Class II,

1.2. Characteristics

1.2.1. General characteristics:

Kernels should have following characters:

- Kernels should be intact. Missing the tegument and small damages not more than 3 mm diameter and 1.5 mm deep are not considered as defective kernel.
- Kernels should be dry. Kernels should be free from abnormal external moisture, moisture content should not be more than 6%.
- Kernels should be clean and contain no visible foreign matter.
- Kernels should be sound. Rotten and rancid kernels not suitable for consumption are not considered as sound kernel.
- Kernels should be fully developed. Shriveled and shrunken kernels are not considered as fully developed.
- Kernels should not be rancid.
- Kernels should not contain defects which make kernels unsuitable for consumption[2]
- Kernels should be free from alive insects and rodents whatever their stage of development.
- Kernels should be free from any damages caused by insects, rodents and other parasites.
- Kernels should be free from mold.
- Kernels should be free from foreign smell and taste.

1.2.2. Group characteristics

1.2.2.1. Group characteristics of rounded hazelnut kernels

The widest diameter on equatorial plane of the kernel should be equal or near to their length and they should be round (spherical) in shape.

1.2.2.2. Group characteristics of pointed hazelnut kernels

The widest diameter on equatorial plane of the kernel should be shorter than their length and they should be pointed in shape.

1.2.2.3. Group characteristics of other hazelnut kernels

Other hazelnut kernels should have group characteristics other than rounded and pointed hazelnut kernels.

1.2.3. Class characteristics

1.2.3.1. Extra

Hazelnut kernels in this class should be in superior quality. They should have characteristics of extra class and/or commercial type[3].

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[2] Unless kernels loose its quality characteristics and become unsuitable for consumption, changes in smell and taste can be tolerated.

[3] Commercial type means hazelnuts kernels in each lot are in same type and appearance or could be mixed of cultivars officially defined by producer country.

Hazelnut kernels should be free from any defects. However slight superficial alterations which do not effect the visual appearance, quality, keeping the quality and marketing in packages do not considered as a defect.

1.2.3.2. Class I

Hazelnut kernels in this class should be in good quality. They should have characteristics of class I and/or commercial type. Slight alterations in shape and color which do not effect the visual appearance, quality, keeping the quality and marketing in packages are allowed.

1.2.3.3. Class II

Hazelnut kernels in this class do not have the characteristics of Extra and Class I classes but have minimum requirements defined above. In this class there may be defects which do not effect the visual appearance, quality, keeping the quality and marketing in packages.

1.2.4. Size characteristics

Sizing is determined by measuring the diameter at equatorial section by means of round-holed screens. The sizing is expressed by the largest and smallest sizes. The smallest size and a statement "and above" and the largest size and a statement "and below" are used.

The minimum size in Extra and Class I is 9 mm. In piccolo hazelnuts or similar types, diameter between 6 mm-<9 mm is allowed in sizing.

In sized kernels, the difference between minimum and maximum diameter should not exceed 2 mm. For Extra and Class I kernels, all the diameters are allowed over the minimum diameter.

To prevent confusion, the use of term of "and less" is not allowed on products prepared under a certain sized label.

1.3. Tolerances

1.3.1. Quality tolerances

Quality tolerances for classes are given in **table 1**.

1.3.2. Size tolerances

Kernel diameters can be out of the range in each class by 5 % in rounded kernels and by 10 % in pointed kernels by weight. In case of sizing in 1 mm intervals in each class, these tolerances are increased to 10% for rounded kernels and 15 % for pointed kernels by weight. Tolerances in each given diameters is ±0,2 mm.

1.3.3. Mineral impurity

Ashes insoluble in hydrochloric acid must not exceed 1 g/kg.

Table 1- Quality tolerances

Maximum allowed defects	Tolerances allowed (% in weight)		
	Extra	Class I	Class II
Rancid*, rotten, moldy, having bad smell and taste, damaged by insects or rodents [4] (+)	1	2,0	3
Not fully developed, including shrunken and shriveled, stained, yellowish tumor formed kernels	2	4	8
Mechanically damaged kernels[5]	3	8	10
Twins (not included in total tolerance)	2	5	8
Inshell hazelnuts, pieces of shell and tegument, hazelnut cracks and dust	0,25	0,25	0,25
Foreign matter	0,05	0,05	0,05
Total tolerance[6] (maximum)	5	12	16

** An oily appearance of the kernel meat does not necessarily indicate rancidity.*
+ Living insects or remains of animals are allowed inadmissible in any class.
The maximum tolerance is 10% for Extra and Class I which include kernels produced in the same region but different in cultivar, commercial type and shape. If cultivar and commercial type is marked, these specifications are also applied to Class II.
[4]) If an "old crop" statement is declared for the product these tolerances are increased to 1.5 %, 2.5 % and 4 % respectively in Extra, Class I and Class II.
[5] The percentage of kernel pieces may not exceed 0,5 %, 1,0 %, and 2,0 % for Extra, Class I and Class II, respectively.
[6] If an "old crop" statement is declared, the total tolerances for Extra, Class I and Class II are 6 %, 13 % and 18 %.

1.3.4. Crops of different years

Crop of different years should not be mixed.

1.4. Code numbers for specifications, evaluations and Analyses

Code numbers for specifications, evaluations and analyses are given in **table 2**.

Table 2- Code numbers for specifications, control and analysis.

Specifications	Specification code number	Control and analysis code number
General characteristics	1.2.1	
Evaluation of product	1.2.1	2.2.2
Determination of moisture content	1.2.1	2.3.1
Group characteristics	1.2.2	2.2.2
Class characteristics	1.2.3	2.2.2
Size characteristics	1.2.4	2.2.2
Determination of foreign matter	1.3.1	2.3.3
Determination of minerals	1.3.3	2.3.2
Labeling and packaging	3.1-3.2	2.2

2. Sampling, Evaluations and Analysis

2.1. Sampling

A lot is defined hazelnut kernels which are in same group, class, size, production year and package, and submitted evaluations at once. Unit in evaluation is outer package.

Large packages including smaller packages are considered as a one unit. No less than 5 samples, between 5-10% of sample is randomly taken from each lot. If the number is decimal, then it is rounded to upper whole number.

For sampling, each large package is opened one by one, and the content is poured on evaluation table or brand, then mixed. Approximately 1 kg of random sample is taken.

If small packages are in large package, small packages are randomly taken to make 1 kg sample, this packages are opened and the content is poured on evaluation table or brand and mixed.

2.2. Evaluations

2.2.1. Evaluation of package

Evaluation of the package and packaging material is determined by investigating specifications prints and label visually and by weighting. The results are compared to specifications given in titles 3.1 and 3.2.

2.2.2. Evaluation of hazelnut kernels

Evaluation of hazelnut kernels is done by touching, looking, smelling, cracking, tasting, screening and weighting in samples taken from evaluation table and results are compared to specifications given in title 1.2.

2.3. Analysis

2.3.1. Determination of moisture content of hazelnut kernels

2.3.1.1. Method 1- Reference method

2.3.1.1.1. Principle

The moisture content of hazelnut kernels is determined as weight loss by drying kernels in an oven at 103±2°C at ambient air pressure for 6 hours.

2.3.1.1.2. Tools

2.3.1.1.2.1. Ceramic mortar with appropriate pestle or food chopper

2.3.1.1.2.2. Analytical balance assensitive to 1 mg

2.3.1.1.2.3. Cylindrical, flat bottomed glass or metal containers, 12 cm in diameter and 5 cm in depth, provided with well fitting lids

2.3.1.1.2.4. Electrically heated temperature controlled oven with good natural ventilation, regulated so that the temperature is maintained at 103±2°C.

2.3.1.1.2.5. Desiccator containing an effective desiccant (e.g. calcium chloride) and provided with a metal plate which allows the containers to cool rapidly.

2.3.1.1.3. Sample preparation

Kernels are separated from teguments (testa) and grinded in mortar or chopped by a food chopper into a small pieces 2 - 4 mm in size.

2.3.1.1.4. Moisture determination process

Dry the containers and their lids in the oven for at least 2 hours and transfer to the desiccator. Allow the containers and lids to cool to room temperature.

Moisture content is determined on 4 samples /50 g each.

Weigh the empty container and lid to the nearest 0.001 g (M_o).

50 g sample is weighted in weighted containers. Spread the material all over the base of the container, seal the container quickly with the lid and weigh the whole (M_1). These operations are performed as quickly as possible

The open containers, with their lids beside them, are placed in the oven (Title 2.4).

The oven is closed and allowed to dry for 6 hours. The oven is quickly opened, the containers are covered with their individual lids, and placed in the desiccator to cool up to the ambient temperature (Title 2.5). After cooling to ambient temperature, the covered dish is weighted to the nearest 0.01 g (M_2).

The moisture content of the sample, as percentage by mass is given by the expression:

$$\text{Moisture content (\%)} = \frac{(M_1-M_2)}{(M_1-M_o)} \times 100$$

Where;

M_1: Sample weight (g) before drying +tare (g)
M_2: Sample weight (g) after drying +tare (g)
M_o: Weight of the container (g)

After determination of moisture content on 4 samples on average is calculated and compared to title 1.2.1.

2.3.1.2. Method 2- Rapid Method

2.3.1.2.1. Principle

Determination of the moisture content using a measuring instrument based on the principle of electrical conductivity. The measuring instrument must be calibrated against the laboratory method.

2.3.1.2.2. Tools

2.3.1.2.2.1. Ceramic mortar with appropriate pestle or food chopper.

2.3.1.2.2.2. Measuring instrument based on the principle of electrical conductivity.

2.3.1.2.2.3. Determination

The glass is filled with the substance to be examined (previously grounded) and the press is applied on the sample until a constant pressure is obtained.

The values obtained is read on the scale

After each reading, clean the glass thoroughly with a spatula, stiff bristled brush, paper napkin or compressed air. The results are compared with title 1.2.1.

2.3.2. Determination of mineral impurities

Determination of mineral impurities is done based TS 1128 ISO 763. The results are compared to specifications given in title 1.3.3.

2.3.3. Determination of foreign matter

Determination of foreign matter is done on 1 kg samples taken from evaluation table according to title 3.1. Foreign matter are separated, weighted and percentage is calculated. The results are compared to specifications given in title 1.3.1.

2.4. Comparison of the results

A product of a Lot is considered suitable for standards if the results of evaluations and analyses are in accordance with standards

2.5. Report for evaluation and analyses[1]

The information below should be mentioned in the report of evaluation and analyses:

- Name and address of company,
- Name and address of laboratory evaluations and analyses are made,

[1] *NOTE of TSE: All the referred standard numbers, publication dates, Turkish and English definitions are given at the beginning of the article.*

- Name, job title and responsibility of lab. personnel who made evaluations and analyses,
- Dates of sampling, evaluations and analyses,
- Definition of the sample
- Code numbers of standards applied to evaluations and analyses,
- Presentation of the results,
- Processes applied in analyses to prevent the factors which can change the results of evaluation and analyses,
- Processes applied in analyses but not considered as a obligatory however mentioned in methods of evaluation and analyses,
- Incompliance weather or not in standards,
- Serial number and date of the report, page number of each page and number of total pages.

Validity of the control certificate is good for 60 days if the product meets this standards.

3. Presentation to the Market

Hazelnut kernels are presented to the market in packages.

Hazelnut kernels should be transported to market under healthy conditions without decomposition.

3.1. Packaging

3.1.1. Uniformity

The content of each package should be uniform for group, class and size and include hazelnut kernels from the same source of group or commercial type or class. The product seen through the package should be representative of the product inside.

3.1.2. Package

Hazelnut kernels should be packed in such a way to protect the product properly.

The materials used inside the package should be new, clean and can protect the quality of the product from any external or internal damage. Especially the materials used in paper, stamps and labels, and glues and ink used in printing and labeling should not be toxic to the product.

Packages should be free from all foreign matter.

Hazelnut kernels are presented to the market either in bags or in strong packages. Small consumer packages in each large package should be in same weight include hazelnut kernels in the same class, cultivar and commercial type.

3.2. Labeling

The information below should be printed on each side of package that label should be visible, easily readable and not erasable:

- Commercial name and address of the company, or short name and address or trade mark[7]
- The shipping label (where applicable): Shipping label should correspond with the shipping label on the Bill of Loading,.
- Origin of product: Country of origin, and, in request, name of the growing region or national, regional or local name,
- Mark and number of this standard (TS 3074),
- Number of the lot,
- Name of the product (Hazelnut kernels),
- Production region,
- Group,
- Class,
- Size,
- Crop year,
- Expiration date of product advised by the company,
- Weight[8] (gross and net). If the gross weight is indicated, the tare of packaging material must not exceed 2.5% for sacks in larger than 50 kg, and 3.0 % for sacks in lesser weight. If the nuts are presented in double sacks other than paper or polyethylene, the net weight must be indicated.

Net weight, or number of pre packages followed by net unit weight for packages containing pre-packages.

In small packages printing name of company or short name and address or trade mark, name of product class and weight are enough.

In export products, these information should be printed in foreign language besides Turkish. Pictures and other information can be printed on packages in condition that statement should be true and not contradicting the label.

4. Other Conditions

Packages containing hazelnut kernels should not be stored with materials which gives bad smell and causes dirtiness, in processing rooms, storage rooms or vehicles.

- Packages should be stored in cool, and aerated storage rooms, and should not be left, loaded or unloaded in the rain.
- The packages of hazelnut kernels should be stored on wooden pallets as piles of not more than 10 packages, and enough space should be given between piles for aeration in storage rooms.
- Hooks should not be used for loading and unloading inshell hazelnut bags.

[7] The national legislation of a number of European countries requires the explicit declaration of the name and address
[8] Net weight has to be indicated at the request of the importer or the importing country.

4.1. Grower/handler or seller who declares the production of inshell hazelnuts under standards are obliged to present a "certificate of control" upon request. On this certificate, information below should be reported;

- Hazelnut kernels carry the specifications in title 1,
- Evaluations and analyses in title 2 were completed and the results are in accordance with standards.

Reference

UN/ECE TRADE/WP 7/GE 2/1998/14

VII. SPECIFICATIONS

Mühlenchemie GmbH
Postfach 3040 · 89020 Ulm

Product Specification Hazelnutkernels

Date : 03/11
Page : 1/2

Product:	Hazelnut Kernels
Date of Effection:	March 2011
Norm / Standard:	(EC) 165/2010 for Aflatoxines, (EC) No 396/2005 for Pesticides, Conformity with German/European Food Law

Sensorical Requirements:

Look/Colour:	typical, light brown to brown colored whole kernels, free from visible mould
Smell:	typical, free of foreign smell
Taste:	typical, not bitter, free of foreign taste , free of any rancidity

Size Requirements:

faq	9/15 mm, <11 mm - max. 25 %*
Std-2-	11/13 mm +/- 5 %*
std-1-	13/15 mm +/- 5 %*
others	+/- 5 %*

*Tolerance: +/- 0.2 mm

Quality Requirements:

- shrivelled	max. 4 %
- rotten - mouldy - mouldy, hidden - rancid - insect damaged	max. 1.5 %* max. 2.5 %** *new crop **old crop
- broken - mechanically damaged	max. 7 % max. 2 % broken
- shells, skins - inshell kernels - dust	max. 0.2 %
- foreign materials, endogen	max. 0.05 %
- foreign materials, exogen (glas, metal, plastics)	absence

Physical- / Chemical Requirements:

moisture	max. 6.0 %
FFA	max. 0.8 %
POV	max. 1 meqO_2/kg
Aflatoxines B_1, B_2, G_1, G_2	B_1 max. 5 µg/kg, Σ max. 10 µg/kg

Microbiological Requirements:

Total plate count,aerobic, mesophil	max. 100.000 ufc/g
Moulds	max. 10.000 ufc/g
Yeasts	max. 10.000 ufc/g
Enterobacteriaceae	max. 1.000 ufc/g
E-Coli	absence
Salmonella	absence
Staphylococcus aureus	absence

Pesticides / Ressidues Requirements:

According to:
- Regulation (EC) No 396/2005 for Pesticides
- Directive 91/414/EEC for active Substances

approved: Dr. Ralf Borginski (Manager QM)	Version 03/2011	Date 01.03.2011

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