Corn Embryo Discoloration (Shinguro)

July 11th 2016

National Federation of Agricultural Co-operative Associations (ZEN-NOH)

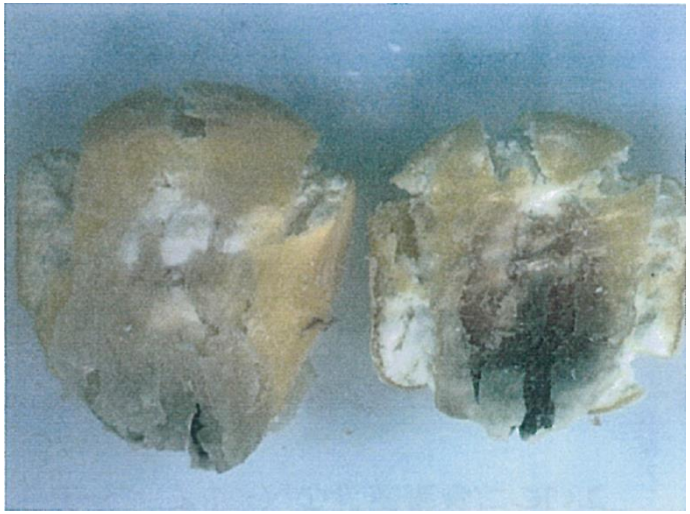
About the “Shinguro”

The kernel itself Doesn’t look like black colored but germ that is slightly black can be seen through.

When cut in two, the germ is obviously discolored comprehensively and uniformly.

(top: normal kernels
bottom: Discolored kernels)

About the”Shinguro”



Flaked corn used for cow is the big problem when Embryo Discoloration occurs due to very bad appearance. Customers surely dislike discolored flaked corn as this black germ reminds them of “Damage” or “Harmful to their livestock”.

Top: Embryo discolored corn after flaking process
Bottom: Normal corn after flaking process

About the”Shinguro”

Previously we sent a sample to FGIS and they showed their inspection method.

> First, they cut the kernels length wise, in official inspection of
> kernels, inspectors carefully check the germ area to check for germ
> damage or any amount of different color molds .
> From the photo , this looks like germ damaged kernels due to bad
> storage , where the kernel because of the oil content in the germ area
> get rancid and change color to darker. The inspector compare how dark
> the germ area to an official color print available in the official
> labs. If the color of the germ area meet or exceeds the color of the
> official darkness of the germ damage print then that kernel is
> considered germ damaged. The whole germ area must meet the color. We
> only remove carefully the cover over the germ of the kernel to examine.
> It appears that the photos have no molds. Any amount seen by the naked
> eye under the seed coat of the germ area, we consider the kernel mold
damage.
> Here you have germ damage due to bad storage if that kernel where the
> oxygen is less.
> A severe stage of bad storage for the kernel will be starch damage and
> the whole kernel will start looking black in color, we also compare
> the external color, without cutting the kernel ,to a color print to
> determine heat damage.
> The inspector cut by the Boerner divider a 250 grams and checks all
> types of damage kernels, weigh the kernels and get a percentage based
> on the weight of the portion.
> If a kernel meets the heat damaged line , then that kernel is part of
> the total damage and also gets weighted separate for the heat damage
> grading factor

About the”Shinguro”

FGIS showed their result as well

Analysis, inspection, observation and recommendations :

Sample type: Submitted ,595 grams .
Broken Corn and Foreign material: 37 grams. 6.2%
Damaged kernels total: 6.1%
Of which, 1.0 germ damaged kernels and 5.1% mold damaged kernels.
Heat damaged: zero%
Odor: ok

Remarks:
The germ damaged kernels in the submitted sample is not high, this type is caused in storage due to less ventilation .

The mold damaged kernels is higher than germ damaged. All mold is one type: Blue Eye Mold, caused by a species of Penicillium. Some kernels appeared to be just getting the mold under the germ area seed coat in the plumule area indicating a need to watch the moisture level and other blended corn.

This storage type mold increase when moisture level get to be high.

Overall the corn does not appear to be deteriorating , has good odor.

By good blending practices, being careful with the moisture content and moving the corn around for good ventilation, this will help till the corn get utilized.

About the “Shinguro”

And possible kinds of damage/Non-damage and the risk profile of Blue-eye Mold

GERM DAMAGE

Portion for Analysis: Approximately 250 grams

Kernels of corn which are damaged by respiration or heat, but which are not materially discolored, shall be considered damaged. Kernels with germ areas discolored to the degree shown or worse are considered damage.

If necessary, carefully remove the germ covering from the kernel. Scraping too deeply can destroy the evidence of damage and cause non-uniformity of interpretation.

Discolored germs that do not meet the minimum coverage requirement may be considered damage provided the degree of discoloration is greater than shown and the overall “prorated” appearance meets the minimum coverage and intensity level depicted. For example, to be considered damage, when the degree of discoloration is twice that shown, only half of the germ area needs to be discolored.

GERM (NOT DAMAGE)

Portion for Analysis: Approximately 250 grams

Kernels of corn with only the plumule discolored **ARE NOT** considered damage. The outward appearance is similar to blue-eye mold. Consequently, it may be necessary to gently lift/remove the germ cover to make an accurate determination.

BLUE-EYE MOLD DAMAGE

Portion for Analysis: Approximately 250 grams

A germ affected with blue-eye mold, regardless of the size of the mold is a damaged kernel. If the mold is distinct, it is not necessary to open or scrape the kernel. When necessary, carefully lift the germ cover to avoid destroying evidence of mold.

NOTE: Do not confuse blue-eye mold with purple plumules. Any amount of mold that penetrates the seed coat of the kernel is considered damage (e.g., crown, tip, sides, or back).

Blue-Eye Mold

Grain Affected:	Corn
Mycotoxin:	None
Pathogen:	Penicillium oxalicum
Synptom:	Powery green or blue-green mold on and/or between kernels usually at the ear tips. Dis coloration of germ indicates kernel death.
Conditions:	Primarily a storage mold. Enhanced by pro longed wet-holding periods, especially on cob stored corn in cribs. Moisture/Temp. >14%, 25 C (75 F) for A. glaucus and >18%, 5 C(40 F) for P. oxalicum. Humidity >70%. Can occur in field if introduced through insect/bird damage.
Inoculumn Dispersal:	Soil and airborne, insects, birds, equipment and storage facilities.
Inoculumn Survival:	Overwinters on/near soil surface in host resi dues. Equiptment and storage facilities.
Effect on Crop:	Decreased feed and market value.
Management:	Early harvest, areation and drying to reduce moisture <15%
FDA Action Level:	None
Livestock Affected:	None
Livestock Symptoms:	None
Human Symptoms:	None

Blue-Eye Mold (GIPSA)

Purple Plumule (GIPSA)

About the “Shinguro”

- Not really know what makes “Shinguro”.
- Looks like “Blue-Eye Mold” or “Purple Plumule” but unlikely.
- Very few found in S. American or Black sea corn but quite many seen in US corn.

About the “Shinguro”

We would like you to share information you have and expect your research on Embryo Discoloration. Our concern is…

・What is the reason why discoloration occurs – mold, heat damege, polyphenol reaction can be considered but no evidence.

・How to avoid our corn from discoloration? – most likely happening at farmer’s bin? internal facility? Export elevator? On vessel?

・Why mainly US matters? – We rarely have this problem with other corn exporting origins.

・Can this be proven to harmless to livestock animals?

Any suggestion/knowledge would be appreciated

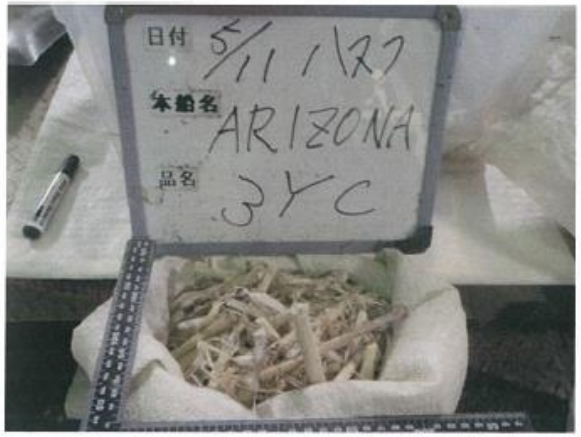
Foreign Material

Foreign Material

Very dangerous as contamination damages facility and potentially go through farmer

Metal

Rocks



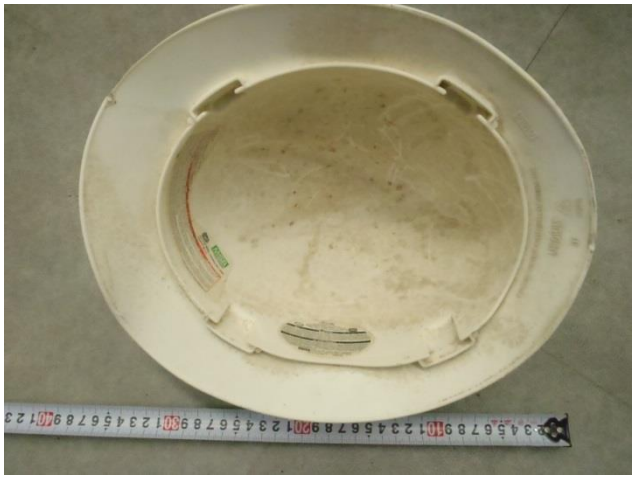
Husk

Birds

Foreign Material

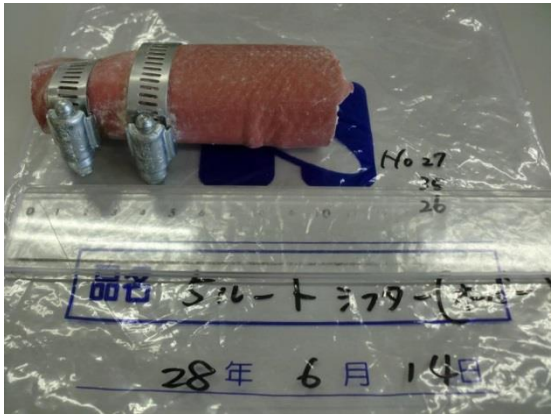
Rubber Piece

Helmet



Cellphone

Air Hose



Thank you for your efforts!

Quality: A Key Factor in Competing for U.S. Market Share
By: Erick Erickson, U.S. Grains Council Vice President

Corn quality, good and bad, is an issue often raised by customers as U.S. Grains Council (USGC) staff promotes U.S. corn exports around the world. And while the specific quality requirements of an export shipment are established in individual sales contracts, the Council always is looking for ways to enhance the quality image, or the quality brand, of U.S. corn.

Encouraging the entire corn production chain to continually improve the quality of U.S. grain is a critical component of safeguarding U.S. competitiveness in export markets.

Production by export competitors has risen sharply in recent years. Since 2005, Brazil and Ukraine have increased their exportable corn supplies by about 32 million metric tons (1.3 billion bushels), while U.S. share of global corn trade has fallen from its previous range of 50 to 60 percent to about 38 percent last year.

This means defending U.S. market share has become an important task in marketing the U.S. corn crop. While many factors in grain purchasing decisions are beyond our control, working together, we can have a large measure of control over corn quality.

U.S. corn quality is influenced by every element of the production and marketing system – seed development, equipment design, planting, harvesting, storage, handling, transporting and trading. Seemingly small actions that appear to be far removed from U.S. export customers can influence the quality image of U.S. corn when it is received by export customers.

Corn from a given farm flows into a veritable ocean of corn that travelsfrom thousands of farms through hundreds of elevators, trucks, barges and railcars being mingled and blended into the final lots that get loaded into the hold of a vessel bound for foreign ports. And once a producer delivers his or her corn to that first point of sale, the quality of the final cargo is out of that farmer's control.

But each farmer has the opportunity to do what they can do, which includes:
delivering corn to export channels with proper moisture levels;
preventing foreign materials such as cellphones, bolts, birds, rocks, etc., from being mixed into loads of corn;
and using proper drying techniques to minimize stress cracks.

Every step in managing corn quality on the farm is a tradeoff of cost versus value, and generally these three steps may not bring additional compensation at the local elevator. And if others do not give the same attention to quality, that final export cargo may not reflect fully the care which you took with your corn. But quality must start somewhere, and must be minded throughout the marketing system. If not you, then who? If not now, then when?